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## ADENOMA OF THE KIDNEY—SUCCESSFUL NEPHRECTOMY.

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Cases of nephrectomy, successful or otherwise, have long since ceased to excite general interest unless their merit lies in some feature outside of the simple operative act and its success or failure. Such merit, in my opinion, is offered by the case I present for consideration, in this, that it furnished clinically the features of cancer, that the gross appearance of the organ when removed justified the worst prognosis, that two excellent pathologists pronounced its microscopic structure to be that of cancer, but that nevertheless the neoplasm turned out to be adenomatous, and the patient to-day, more than a year from the operation, is alive and well.

Such records are surely encouraging for the general operator and should be put in evidence. Moreover, the history of renal adenoma and its literature, so far as I know, have not been very systematically worked out, and this case is reported with the aim of attempting to fill the gap.

The description of the pathological specimen, the drawings and the microscopic description, together with the history of adenoma and the bibliography, have been worked up seemingly with great care by Prof. Hermann M. Biggs, of the Carnegie Laboratory, to whom I am much indebted for the preparation of that portion of my paper, and whose words I have directly incorporated. The clinical record need only be brief:

A gentleman of forty-nine, pale and feeble, called upon me May 19, 1889, stating that he had been failing for more than a year, and for many weeks had passed urine resembling pure blood. He had been treated for alleged stomach trouble of some sort, and dieted, rested, and given astringents *ad nauseam*. Rest did not moderate the flow; on the contrary, it was commonly worse at night than by day, a peculiarity not unusual in hæmorrhage from the kidney, as Guyon has pointed out.

The urine passed in my presence and brought to me resembled dissolved currant-jelly, or perhaps grape-jelly, and all that the patient passed was of this hue; he was blanched and feeble and manifestly in a fair way to lose his life by collapse from loss of the nutritive juices unless something were done to put an end to the leak.

I found that the amount of urea excreted in twenty-four hours was ample; I easily excluded the bladder from disease by the well-known test of first collecting a portion of the urine passed in my office, then washing the bladder until the flow came away perfectly clear, then

getting the patient to wait for a time and finally to pass another specimen, and finding that the last absolutely resembled what first flowed in the office, there being no bright blood in either specimen, and each being equally dense. Then under chloroform I clearly mapped out a moderate enlargement of the right kidney, and placed the alternative before the family of the patient of trying the milk-and-rest cure with certain styptics, or taking the bolder course of extirpating the kidney, hoping that the disease might not be malignant, but being unwilling to assert that it was not so. The latter alternative was chosen by the family, and, therefore, on May 28, 1889, with one transverse incision beneath the ribs and another liberating incision downward, I extirpated the kidney without any particular trouble.

The only elements of special interest in an operative sense were the plain demonstration of the upward and downward movement of the kidney as the diaphragm relaxed and contracted, which was shown very clearly by a livid mass in the fatty capsule of the kidney, which could be seen to fluctuate over a space of at least two inches under the movements of the diaphragm, the dark body being watched as it went upward and downward beneath the fascia transversalis before the abdominal cavity had been finally opened.

Another point was that the fatty capsule was exceedingly thin and particularly hard, so that the true capsule of the kidney adhered to the surrounding structures and had to be separated with great care and some dissection. Indeed, I feared that I must necessarily open the peritoneal cavity, so strong were the adhesions anteriorly to the lower part of the kidney. The kidney itself felt like rock; it was not very large, but was excessively hard and mottled in color, being somewhat uneven upon its surface. Silk ligatures were used, the wound dressed as usual, and no particular disturbance occurred during the patient's recovery, except that first one and then the other leg became œdematous, the swelling being very considerable and very tense.

The cause of this was not clear to me then, and is not now. I presumed that it might be due to pressure from retro-peritoneal glands, although at the time of the operation I had not felt any; but as the swelling first came upon the left limb, the right kidney having been removed, I failed to understand it. There certainly was no pyæmia, there certainly was no phlebitis; both legs became œdematous and so remained for many months. Recently this œdema has disappeared. I noticed precisely the same thing occur in another instance in which I removed a large stone from the kidney. The opposite thigh and leg became œdematous as the patient was recovering, the œdema finally disappearing. I have not encountered this feature in abdominal nephrectomies.

My patient was up and out at the end of a month, he remained feeble and anæmic for a considerable period, and then began to grow fat. He is now perfectly well physically, his urine is abundant in quantity and absolutely clear. His functions are all properly performed, and the only particular in which he feels at all less well than before his kidney was removed is in that his nerves are less steady than they were before the operation; he attends to his business and is in all physical respects reasonably, if not perfectly well.

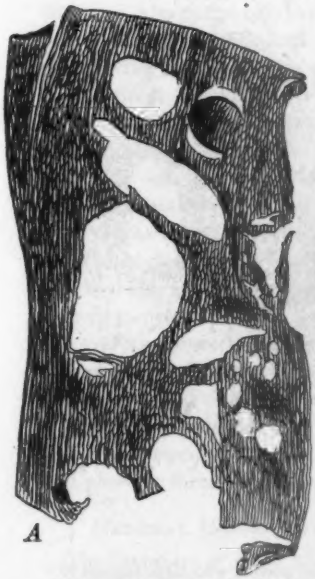
The kidney, of which the accompanying plate is a fair counterfeit, its hardness, its adhesions, made me feel that a bad prognosis—as to ultimate recovery—was prudent, and this I gave the family. My fears were substantiated by receiving a report from a pathologist who gave me the name of another who had examined the sections—both pronouncing it cancer.

But my patient did not die, and there was no evidence of recurrent disease. The wound healed perfectly, and I therefore besought Dr. Biggs to take the kidney again (he had at first received it, but going to Europe he had not made the first report) and to give me some explanation of the apparent irregularity in the facts. I append his report:

### Description of the Diseased Kidney.

"The organ in the fresh condition was considerably larger than the normal kidney. Its thickness especially was increased and measured

Fig. 1.




Section of the cortex of the kidney showing spaces where numerous adenomata have fallen out of their capsules. Renal tissue almost completely destroyed. × 4. *A*. Compressed and atrophic renal tissue.

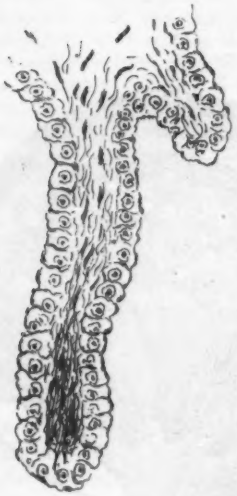
Fig. 2.

Small adenoma with fibrous capsule and radiating bands of connective tissue forming small, irregular, elongated spaces, which are lined with cells. × 20.

nearly two inches. Its weight in the fresh condition was not determined. The capsule was greatly thickened and was firmly adherent. The surface through the capsule was distinctly nodular. On section the

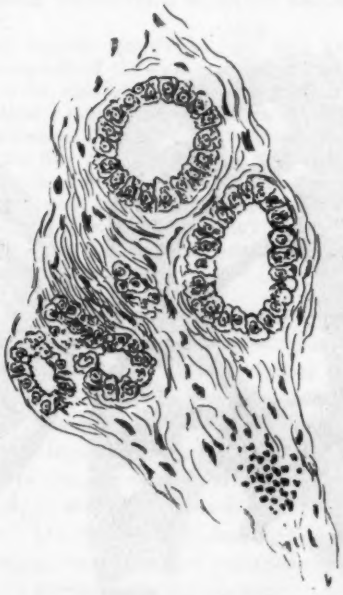
cut surface presented a remarkable appearance. Almost all traces of the normal renal tissue were destroyed and the outlines between pyramidal and cortical tissue were completely obliterated. (Fig. 1.) The organ seemed to be composed of an enormous number of nodules, varying in size from 2 or 3 mm. to 1½ cm. in diameter, and in color from a white or yellow to a terra-cotta or bright red. There were a few small cysts with dark colloid contents. Between and around the nodules was a large amount of new-formed connective tissue. At some points this formed quite large masses of dense, hard fibrous tissue. The consistence of the different nodules varied greatly. In some it was scarcely greater than that found in encephaloid carcinoma, while in others it was nearly as great as that shown in fibromata. There was scarcely any trace of normal renal tissue between the growths. The connective tissue around many of the nodules formed distinct capsules for them, and this was

Fig. 3.



Long unbranched tuft formed by a reduplication of the wall of a cyst, into the cavity of which it projects.

Fig. 4.



Alveolar portion with large amount of connective tissue (atrophic).

especially noticeable around those having a yellow color. The neoplastic tissue had also extended at several points into the calices and pelvis of the kidney. The consistence of this tissue was very slight. (Fig. 2.)

"Microscopical examination of the tissue extending into the pelvis, and of the softer nodules, disclosed a complex structure similar to that found in renal adenomata of both the alveolar and papillary type.

Most of the tissue was composed of branching trabeculæ of connective tissue covered by short cylindrical or cubical granular epithelium, closely resembling in appearance the normal renal epithelium. The tufts thus formed were densely packed together, so that it was difficult to make out the structure. (Fig. 3.) The remaining tissue was composed of distinct alveolar spaces lined by epithelium of a type similar to that covering the tufts. The amount of connective tissue in different portions varied greatly. At some points the bands were thick, dense, and numerous, at others very thin and delicate. Occasionally were seen quite long unbranched tufts projecting into open spaces, which spaces were lined by epithelium. (Fig. 4.)

"It was found that the color and consistence of the older nodules depended upon the kind and degree of degeneration that had taken place in them and upon their vascularity. The various types of degeneration shown in adenomata, viz., fatty, fibrous, and pigmentary, were found in different nodules. The fibrous masses seemed to be in part at least the result of the increase of the fibrous tissue and the degeneration and absorption of the epithelium of certain nodules. At some points the epithelium had undergone an extensive fatty degeneration, thus giving to some of the nodules their yellow color. Only the neoplastic tissue in the pelvis of the kidney, and some of the smaller growths, showed the characteristic structure of renal adenoma; in the other portions the original structure was completely obscured by the extensive degenerative changes. The kidney tissue itself seemed to be almost entirely replaced by the new growths, although the general form of the organ was retained.

"Although there were points in different growths where a characteristic alveolar structure was shown, yet the papillary formation appeared largely to predominate. Many of the alveoli present, however, seemed to have been formed as alveoli, and not produced by compression and the transformation of opposed papillary processes into alveoli, as has been suggested by Weichselbaum and Greenish is often the case. As the structure of both forms of adenoma were here shown in the same growths, it would seem as if the separation of adenomata into papillary and alveolar forms was only an arbitrary distinction."

### General Consideration of Adenoma of the Kidney.

The literature of renal adenoma is rather scanty and mostly of recent date. Tumors known as adenomata were long ago described as occurring in the kidney, but they were supposed to be of extremely rare occurrence. Formerly, they were generally confounded with other growths, and their supposed rarity was probably due to this confusion as to their nature, and to their usually small size and benign character. Recent investigations, however, have shown that adenomata are of comparatively common occurrence in advanced life, although only in very exceptional instances do they reach any considerable size.

In a report to the Scientific Grants Committee of the British Medical Association, made in 1887, on New-growths of Kidney and Bladder, T. F. Paul, F.R.C.S., says: "Adenoma of the kidney is scarcely recognized as a variety of new-growth; and, although we have only three cases, from my own collection, to bring forward, we do not regard it as extremely rare, since, owing to the small size and inoffensive character of the growths, they are liable to be passed over without notice."

Weichselbaum and Greenish, in a very exhaustive paper on this subject, published in 1883, in the *Medicinische Jahrbücher*, report that as far as their observations go, "adenoma never occurs under thirty years of age. After this period it gradually increases in frequency until, after the age of eighty years, it is found in nearly ten per cent. of the cases." The small growths, however, in which form the adenoma usually appears, are (unless a microscopical examination is made) usually mistaken for tubercles or small fibroid tumors which are frequently found in the kidney.

Sturm, in a careful article on this subject, published in 1875, in the *Archiv. für Heilkunde*, thus describes adenoma:

"Adenoma is of comparatively not infrequent occurrence; but up to this time has been described under different names. It develops mostly as a solitary tumor in the lower third at the greatest convexity of one of the kidneys. It always originates in the cortex, beginning by a dilatation of one or more of the convoluted tubules, the epithelium of which undergoes proliferation and causes a gemmation of epithelial cones. These cones are at first hollow, but later, in consequence of secondary changes within the tumor, they appear as solid cones. Adenoma of the kidney and beginning adeno-carcinoma are identical terms. This adeno-carcinoma of the kidney is in every respect analogous to epithelioma of the skin, the mucous membranes, and the mucous glands. The development of adenoma certainly stands in some relation (yet to be determined) to the interstitial connective tissue of the kidney. At least solitary adenoma formation always appears in non-inflammatory, so-called granular kidneys: if adenoma occurs in inflammatory contracted kidneys it is, as it would seem, mostly multiple. These multiple adenomata, which commonly appear at once in both kidneys, have exactly the same structure as the solitary ones. Some of them may develop into genuine carcinomata; most of them, however, degenerate and either appear in the form of peculiar yellow infarctions or as kidney cysts of the most various consistence. Whether these multiple adenomata, which are partially to be looked upon as simply a hypertrophy of the urinary tubules, are actually identical with the solitary form, or whether they stand in somewhat the same relation with the latter as a wart of the skin to epithelioma, I will not undertake to say. At any rate, even after prolonged existence, they almost always produce the impression of a benign neoplasm. The simultaneous appearance of these early degenerating adenomata and inflammatory contraction of the kidney seems to be quite constant, and has been described by old authors as: *Nephritis simplex*."

Synonymes of renal adenoma are: "Lymphangioma (Herschl). Kidney cysts with colloid or melicerous contents (Förster, Virchow, Beckmann, Erichsen)."

Cornil and Ranvier state that: "Adenomata have been accidentally noticed in interstitial nephritis. They have been described by Sturm and Labourin ("Contributions a l'Etude de la Cirrhose Renale," *Arch. de Phys.*, January, 1882). According to Labourin, there are two kinds of tumors: 1st. Tumors of cylindrical epithelium of the renal type, and which are directly derived from the tubules in Bright's granulations. 2d. Tumors of cubical epithelium, which are derived from tubular epithelium which is atrophied or indifferent. From the histological point of view adenomata of the kidney are metatypical epitheliomata; from the clinical point of view they are benignant tumors."

As a rule, adenomata do not exceed a small pea in size, and are frequently much smaller; but in rare instances they reach the size of a large walnut. In about seventy-five per cent. of the cases they are single, but there may be two or more and they may be found in both kidneys. In very exceptional cases one kidney contains a large number of the tumors, of considerable size; and the organ may be almost destroyed. The case here reported is one of this kind.

Adenomata affect the right and left kidney with equal frequency, and apparently they always originate in the cortical portion, and only secondarily involve the pyramids. They appear in the kidney as well-defined yellowish nodules, varying in size from that of a millet-seed to that of a small hen's egg. The smaller ones usually do not have a capsule, but the larger ones may be surrounded by a distinct connective-tissue capsule, formed by atrophy and condensation of the kidney tissue.

The consistence of adenomata varies greatly, depending largely upon the age of the growth and the presence and character of degenerative changes in it. Excepting in those cases in which the tumor has undergone the so-called fibrous degeneration, its consistence is always less than that of the normal kidney-substance, and in some cases the growth may be transformed into a semi-fluid colloid matter, the capsule of the tumor forming the capsule of the colloid cyst. Tumors that have undergone the fibrous degeneration may attain a consistence nearly equal to that of a fibroma. The vascularity of adenomata also varies considerably. The smaller single growths are commonly rather poorly supplied with bloodvessels, but in the larger multiple tumors occasionally the new-formed vessels are so numerous and so large that many hæmorrhages occur in the tumor, and microscopical sections have an appearance not unlike that of cavernous angeiomata.

Owing to the fact that these growths always develop in the cortex of the kidney and are usually subcapsular, Grawitz and Israel (*Virchow's Archiv*, 1883) have expressed the opinion that they are due to the development of portions of the suprarenal capsule which have remained adherent to the surface of the kidney during intra-uterine life. There

can be no doubt that such particles of the suprarenal capsule are found on the surface of the kidney. I have often seen them pointed out by Grawitz in his demonstrations in Greifswald, and have since then not infrequently seen them in autopsies in New York. That adenomata are derived from these, however, does not seem to me proven.

Two forms of adenomata are met with in the kidneys: the papillary and the alveolar adenoma. They are apparently the same in nature. Macroscopically, they are not to be distinguished from each other; and microscopically, the larger tumors may show in different parts of the same growths the histological characteristics of both forms.

### The Papillary Adenoma.

This form consists of a framework of connective tissue, forming spaces of different sizes. From the walls of these spaces, at one or several points, spring papillary tufts, clothed with a single layer of cubical or cylindrical epithelium. These tufts more or less completely fill the spaces. The connective-tissue framework is sometimes rich, sometimes poor, in round and spindle cells, and carries a system of bloodvessels. The lumen of these vessels may be narrow or greatly dilated, forming cavernous spaces. The epithelial cells covering the tufts often undergo fatty degeneration. This degeneration may be so complete that the nodule assumes the appearance of a lipoma.

The tufts when very numerous may be so much compressed and altered in form as to make their recognition difficult. Between the spaces more or less completely degenerated, renal tissue is sometimes found. Thus colloid cysts are formed from compression and transformation of the renal epithelium. The Malpighian bodies generally become fibrous and are frequently found in the fibrous masses remaining after complete degeneration of the renal and adenomatous epithelium.

These growths are apparently produced from the urinary canals, by a dilatation of the tubules and a folding and refolding of the epithelial and connective-tissue wall of the tubule. As the growths increase in size and number, they may extend from the cortex into the pyramidal portion and thence into the pelvis of the kidney.

### The Alveolar Adenoma.

In this form tubular spaces of different sizes are found, which are lined by epithelium. This epithelium closely resembles that lining the convoluted tubes. Weichselbaum and Greenish insist that the alveolar adenomata commence in the convoluted tubes and that the capillary form commences in the collecting tubules; but although the growths differ originally in their genesis and histological structure, these authors state that they may later on pass into each other. This takes place from the papillary excrescences being pressed so tightly together that

they merge into each other and the two halves of papillæ facing each other uniting at the ends form alveoli.

The degenerative changes found in adenomata are common and various. Few new-growths present so frequently and in so many forms retrogressive metamorphosis. Both the macroscopical and the microscopical appearances of the tumors become thus so much altered that they lose all resemblance to the primitive growth, and their identification would become impossible if we were not able to follow the transitional stages in their transformation. In the multiple type of the growths, through these different changes in the different tumors, there results a remarkable variation in color, consistence, and character of the tissue in different parts of the organ. This is unequalled in any other process in the kidney

The fibrous degeneration is one of the most frequent of the changes occurring in adenomata. In this the fibrous trabeculæ in the papillary variety, or the fibrous septi in the alveolar, increase in thickness and at the same time contract, thus compressing and finally producing degeneration and sometimes absorption of the epithelial cells. In this manner in some portions of the growth, or in some of the growths, the cells may all disappear, and the tumor attains almost the consistence and appearance of a fibroma. Another common change is the fatty degeneration. In this the epithelial cells are more or less completely filled with large and small fat-globules. The cells may, in this manner, be almost entirely destroyed, and the tumor acquire a bright-yellow color. Microscopically, it resembles sometimes quite closely fat-tissue.

The degenerative processes may result also in cyst-formation. The new-formed tissue undergoes a fatty and granular disintegration; this detritus becomes suspended in serum, forming a milky fluid, and the capsule of the tumor forms the cyst-wall; or serum may transude into the alveolar spaces, thus producing a dilatation of them. Colloid matter may also be found in these cysts. Again, when the vessels are numerous and thin-walled hæmorrhages may take place into the tumor, the spaces become filled with blood, and thus either a cavernous tissue is formed or a blood-cyst, or finally, a pigmented connective-tissue cicatrix.

As regards the causation of adenomata, Sturm and Labourin have directed attention to their almost constant association with the non-inflammatory new tissue-formation found in the kidney in middle or advanced life. Further than this observation, any assumptions as to their causation are purely speculative.

Adenomata are commonly benign growths, but Delafield and Prudden (l. c.) say that "there are larger tumors involving the whole kidney and accompanied with metastatic growths in other parts of the body which have the same structure as the papillary adenomata."

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# THE CONDITION OF THE HEART IN ANÆMIA, AND THE CAUSE OF THE PULMONARY MURMUR.

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THE subject which I wish to bring forward is the cause of the pulmonary systolic murmur, so constantly present in anæmia. And in order to give the grounds for the views I hold upon this question, it is necessary for me to go more fully than I otherwise should have done into the general question of the condition of the heart in anæmia. Some of the following observations are capable of direct proof; and in support of the rest much evidence may be called, though it falls far short of proof.

*1. Anæmia is a frequent and sufficient cause of fatty degeneration of the heart and of dilatation of its cavities.*

Simple anæmia is but rarely fatal. I can, therefore, offer no post-mortem evidence from my own observation as to the condition of the heart-muscle under these circumstances. However, Walshe, Ormerod, Virchow, Ponfick, and many others all testify to the influence of anæmia in producing fatty degeneration of the heart.

Dr. Goodhart (*Lancet*, vol. i., 1880) expresses the view that in all forms of anæmia in women the heart's impulse becomes diffused and displaced outward; the heart-muscle undergoes fatty degeneration; and the heart, especially the left ventricle, becomes dilated. And he has demonstrated post-mortem in five instances that simple anæmia from loss of blood, in adults of both sexes and of very varying ages, is constantly associated with fatty degeneration of the ventricular walls and dilatation of the cavities, especially the left.

Dr. Bristowe says: "Dilatation, which is sometimes the primary change in hearts that are simply feeble, not only impairs efficiency, but actually furnishes an incentive to cardiac exertion and overgrowth."

*2. In a definite class of cases of anæmia, including chlorosis, cardiac dilatation is a constant and important condition which urgently requires more general recognition and treatment.*

Very little space is devoted to this subject in most of the text-books, and but little importance is as yet attached to it. Consequently, like many others, I was left to find it out for myself; but when once my attention had been directed to it, I found that it had been dealt with in several special articles.

During the last four years I have carefully examined into the state of the heart in five-and-thirty cases of simple anæmia, chiefly in young females, that have been under my care in the Nottingham General Hospital. Each case was under observation for several weeks, and a few for a much longer time. And during the same period I have made similar observations in a much larger number of cases of anæmia due to various cachectic conditions. And as a result I am able most confidently to confirm Dr. Goodhart's statement, at any rate so far as to say that in chlorosis and the simple anæmia of young women the heart's impulse becomes diffused and displaced outward almost invariably. But, contrary to his experience, I think the clinical signs point in these cases to the dilatation affecting chiefly the right side.

*3. In such cases the right side is often the one chiefly affected.*

I have come to this conclusion because the heart's impulse is invariably displaced outward, but generally little, if at all, downward. The apex-beat (that is, the part of the impulse farthest to the left and downward) is, in the vast majority of cases, in the fourth space, sometimes in the fifth, but I have never found it in the sixth. In horizontal positions the apex is usually in the nipple-line, or a little outside it, but it varies from a half inch inside to one and a half inches or more beyond it. To compensate for the variable position of the nipple I have always made in addition actual measurements, and have found the apex-beat from three and a half to four and three-quarters inches, or further, from mid-sternum. The most forcible pulsation is often in the third space, about one inch inside the nipple-line; and I attribute it to the impact of the middle or upper part of the anterior wall of the right ventricle, and not to the auricular appendage. Rindfleisch,[1] in speaking of hypertrophy of the right ventricle, says: "The heart's apex is no longer formed by the left ventricle alone; it is partly, or even wholly, formed by the right one. The apex-beat often becomes indistinct; in its stead we find a basic impulse due to the contact of the conus arteriosus with the chest-wall during each systole, in consequence of the enlargement of the base of the heart in its antero-posterior diameter."

In well-marked cases, especially those occurring acutely and to which over-exertion has contributed, there is often a systolic murmur with its

[1] Pathology. Sydenham Society's Translation. Vol. i. pp. 270, 271.

point of maximum intensity over the fourth left costal cartilage. This, I take it, indicates regurgitation through the right auriculo-ventricular orifice. And this view is confirmed by the turgid condition of the external jugulars, especially the right, which pulsate synchronously with the heart and fill from below.

*4. There are many forms of anæmia, in some of which there are heart-murmurs, and in some not; in some the heart is enlarged and dilated, and in others not. Where the heart is dilated, several different conditions contribute to bring about this result. There are several different murmurs in anæmia, one or all, or none, of which may be audible in a given case. Hence, partly, the divergence of opinions.*

Typical chlorosis I believe to be in the first instance largely, if not entirely, a developmental disease, and, hence, occurring at or about puberty, before development is completed. In one class of cases, severe in point of intensity but limited in numbers, the essential lesion is a "hypoplasia or congenital narrowness of the aortic system." This view, originally expressed by Virchow, has been confirmed by Rokitansky, Bamberger, Quincke, and recently by Fraentzel. In the *Practitioner* for 1889 I recorded a well-marked example, together with the post-mortem conditions. The heart varies much. At times when the general development is poor and there has been no undue bodily exertion, and the affection has lasted but a short time, the heart is abnormally small, corresponding to the dimensions of the aorta, like the heart of a child. At other times, especially when there has been rapid body-growth, underfeeding, and a call for over-exertion, the heart is enlarged, dilated, and hypertrophied. "The vascular walls and their contents are both derived from the same mesoblastic tissues of the embryo. Let us suppose the unborn defect of developmental energy to extend not merely to the blood, but to the cellular lining of the vascular tree as well. A hypoplasia of the vascular system will then be inevitably associated with the hypoplasia of the blood."

In many, indeed in the great majority of cases of chlorosis, the full development of the aortic system is only *delayed;* and the patients eventually get quite well. The ratio of the different organs to one another varies in different individuals, and only approximately approaches a perfect type. In some the brain and nervous system predominate; in others the chest and respiratory system are unusually well developed. Some have a large bony framework; and yet in others, the liver or the kidneys are always "inadequate."

Between the ages of twelve and fifteen in the female, growth and development proceed with extraordinary rapidity; stature and weight being both actually and relatively greater than at corresponding ages in the male. In some cases the development of the vascular system may lag behind the requirements of the body. With this condition, or even with only the feebleness of rapidly growing tissues, much physical exer-

tion (in maid-servants in running up and down stairs; in girls of a better class in playing tennis, etc.) may result in cardiac dilatation.

It is well known that the development of the various organs does not proceed *pari passu*, and that various causes may disturb or delay its progress. I have seen the uterus of a girl of seventeen, who had died of phthisis, indistinguishable in point of size and shape from the uterus of a nine months' fœtus placed beside it, and only to be recognized by the condition of the ovaries. In some cases gastric ulcer or persistent gastric catarrh, in others want of fresh air, may by interference with general nutrition, lead to a similar delayed development of the arterial system, and through that to cardiac dilatation. It is well known that in some forms of heart affection occurring in early life, more especially in mitral stenosis, the aorta, and the arterial system generally, remain imperfectly developed. There is a general hypoplasia of the aortic system. I have myself met with many well-marked instances. Balfour says:

"There is every reason to believe that mitral stenosis is by no means infrequently congenital . . . . and that in these instances it is invariably associated with hypoplasia of the aortic arterial system, and consequently of the body generally."

And again:

"But should a rheumatic attack in childhood or early youth be followed by any considerable mitral stenosis, the effect of this must be to accumulate blood behind the stenotic valve, to diminish the wave of blood sent forward, and thus to lessen the normal distention of the aorta, and to impair the nutrition of all the tissues, producing that retarded development so well known as the constant result of serious cardiac disease occurring in early life, technically termed hypoplasia, affecting primarily the aortic arterial system, and secondarily all the organs of the body."

Dr. Clifford Allbutt has called attention to the influence of underfeeding in producing degeneration of the heart and consequent dilatation. This, of course, applies to both sexes and all ages, but it is specially applicable to chlorosis, in which condition the capriciousness and perversion of the appetite are notorious. But in a far larger number of cases, in which an accusation of capriciousness or perversion of appetite could hardly be sustained, it is a noticeable and very important fact that these anæmic girls take a dislike to the more highly nitrogenous forms of food—meat, fish, milk—and habitually omit them from their dietary. It is probable that the undue prominence of the carbohydrates, and the comparative absence of the albuminates in the food, has at least as much influence in producing the *embonpoint* so general in chlorosis, as the want of exercise and deficient oxygenation of the blood and oxidation of the tissues to which it is so generally attributed.

It is now widely recognized that in many forms of anæmia, though by no means in all, and possibly not to a well-marked degree in all the ex-

amples of the same form, there is a distinct rise in the vascular tension. This is readily perceived by the finger on the radial pulse; but it is still more distinctly shown by the use of the sphygmograph. I have several tracings which show a distinct rise in vascular tension, and many others which show a tension quite up to the normal. These tracings are of the more value because one of the commonest complications in the interpretation of sphygmographic tracings is practically eliminated in these young patients, viz., rigidity and degeneration of the walls of the vessels. The increased tension is so contrary to one's preconceived ideas that it was very slow in gaining acceptance. The causes of it, and more especially its presence in some cases and its absence in others, are not easy of explanation.

It has been shown by Eberth and Schimmelbusch, and more recently and more completely by Professor Hamilton, of Aberdeen, that alterations in the blood may result in a considerable impediment to its free circulation. In healthy blood, the specific gravity of the colored corpuscles is nearly alike with that of the plasma, while that of the colorless is considerably less. Consequently the colored corpuscles keep mainly in the axial stream, while the colorless keep largely in the periphery. Any alteration in the constitution of the blood, either in the plasm or in the colored corpuscles, which form the enormous majority, such as to make the corpuscles either specifically lighter or heavier than the plasma, causes them to move less in the axial and more in the peripheral stream, makes them touch and roll along the sides of the vessel, and very greatly increases the amount of friction, which consequently entails a corresponding increase in the propelling power. There is much reason to suppose that in some forms of anæmia such alteration in the relative specific gravity of the corpuscles and the plasma does occur. In the majority of these chlorotic forms of anæmia the red corpuscles are little, if at all, reduced in number, but are very deficient in hæmoglobin.[1] That makes it extremely probable that they are also reduced in specific gravity, but I believe that point has not been proved yet. Hence, in all probability, the high-tension pulse of anæmia, and, to some extent and in certain cases, the consequent dilatation and hypertrophy of the heart.

The anæmia of malignant disease; of phthisis, of cachectic conditions, and of chronic wasting diseases, is more complex. The total volume of the blood is diminished. The corpuscles and the plasma suffer more nearly in equal degree. There is less capacity for exertion, and so less strain is thrown on the heart. The general nutrition is more gravely impaired. The heart has insufficient pabulum, and so atrophies in correspondence with the general wasting of the body. In these cases, however profound the anæmia, there are generally no cardiac murmurs.

In post-febrile anæmia I have already elsewhere[2] referred to the fre-

[1] American Journal of the Medical Sciences, May, 1890.

[2] Provincial Medical Journal, July, 1890, p. 395.

quency of cardiac degeneration and dilatation, and to the variability of the murmurs.

In cases of anæmia of recent origin, where there has not been sufficient time for dilatation and enlargement of the heart to ensue, there are generally no cardiac murmurs. I have noticed this on many occasions. I may quote two examples:

An unmarried girl, aged eighteen, who had been confined in the workhouse, was shortly afterward admitted into the general hospital with the most profound anæmia, but there was no trace of a cardiac murmur, and no evidence of dilatation or enlargement. She soon got quite well.

A married woman, aged twenty-two, was admitted suffering from most marked anæmia of recent origin, due to metrorrhagia and over-lactation. There was no trace of a cardiac murmur or of enlargement of the heart, and the pulse tension was low. She soon recovered completely.

In these and similar cases the absence of enlargement of the heart may be in part due to rest and absence of exertion from the commencement of the anæmia; and to general failure of nutrition, tending to atrophy of the heart; as well as to the recent origin of the anæmia.

In what I may call, for want of a better term, "gastric cases of anæmia," dilatation of the heart and cardiac murmurs are slight or absent. By "gastric cases of anæmia," I mean those which commence with or are early associated with gastric ulcer or chronic gastric catarrh. In these the general nutrition usually fails, and the state of the heart is one of atrophy rather than of hypertrophy, and hence cardiac murmurs are absent. In these various forms of anæmia where the heart is dilated or hypertrophied, or both, I conceive the change to be due to one or more of the following causes:

1. Congenital narrowing, or delayed development of the aorta, and the aortic arterial system, requiring greater pumping power to supply the needs of the circulation.

2. Increase of resistance in the peripheral part of the circulation from unequal changes in the specific gravity of the component parts of the blood. (These two classes include most of the cases of high-tension pulse.)

3. Malnutrition and degeneration of the cardiac muscle from the circulation through its walls of blood deficient in some of its proper constituents. A larger bulk of this flabby, degenerated, or relaxed muscle[1] is required to do the same amount of work as a smaller bulk of normal muscle in good tone will do. Hence hypertrophy rapidly follows on dilatation.

[1] Balfour: Diseases of the Heart, p. 156. "In chlorosis, and after fevers, etc., the change in the condition of the heart consists in such a complete relaxation of its tissues that in its most extreme form it seems as limp as a piece of wet paper."

4. Overwork, especially associated with constriction of the chest and waist, as is usual in females. (Constriction of the chest during exertion apparently favors cardiac and arterial disease in soldiers.)

There are many different cardiac murmurs commonly audible in anæmia, but, so far as I know, they are all systolic in rhythm. The commonest, and the one most typical of anæmia, is that with its point of maximum intensity in the pulmonary area. The cause of it I shall discuss later.

The next most frequent murmur is at the left apex, and is a true regurgitant murmur, due probably in most cases to relaxation and dilatation of the left ventricle and relative incompetence of the mitral valve. Rheumatism is very common in anæmia, and in some of these cases there is probably rheumatic valvulitis.

A systolic murmur is not uncommon, too, in the tricuspid area, due in all probability to dilatation of the right ventricle and relative incompetence of the tricuspid valve.

A systolic murmur over the aortic cartilage is, in my experience, rare in these cases, and is then often permanent and apparently due to organic disease, except in those instances where it is only communicated from the pulmonary area, and is not independent. These murmurs disappear[1] in the following order, viz.: tricuspid, mitral, aortic, pulmonary.

Thus, there are several distinct murmurs in anæmia, and this has led to much confusion in the discussion of their etiology. The most characteristic murmur is the pulmonary, and of that I shall have more to say shortly.

*5. The pulmonary, so-called hæmic, systolic murmur is not due directly to a change in the blood.*

There are three distinct classes of murmurs called hæmic, namely: the venous, the arterial (those produced at the orifices of the pulmonary and aortic arteries), and the purely cardiac (those audible over the mitral and tricuspid openings); and they have all been for many years attributed to an altered condition of the blood.

That this is a satisfactory explanation in the case of the venous murmurs most admit, although they may not agree as to the exact nature of the alteration. It seems probable that the change is more in the direction of diminished quantity than in altered consistence, and that the murmur is due to imperfectly filled vessels.

1 Balfour says: "All the ordinary murmurs are not infrequently found associated in chlorosis with a true murmur of mitral regurgitation distinctly and clearly audible in the mitral area, and accompanied by distinct accentuation of the pulmonary second sound. And these murmurs disappear in the exact order in which we should expect them to do so; first the mitral murmur vanishes, then the murmur in the aortic area ceases, next the auricular murmur disappears, and, last of all, the venous murmurs become inaudible."

The cause of the arterial murmurs is a more complex problem. I am not prepared to say that diminished volume of the blood plays no part, but it is not sufficient to explain all cases.

It has been stated by Richardson, as a result of experiments, that if an animal be bled until it is feeble, an anæmic murmur becomes apparent; *while if large quantities of saline solution be injected into the vessels*, so as to compensate for the loss, the murmur does not disappear. Much has been founded on these and similar experiments to prove that the altered condition of the blood has, in some way, to do with the generation of the abnormal sound in man. But it is never safe to reason directly from animals to man. And, fortunately, we have in diabetic coma the opportunity for a direct experiment on man to elucidate the point in question. Recently, in a case of diabetic coma in a woman aged twenty-five, Dr. Dickenson introduced into the veins of the arms 106 ounces of saline fluid in the course of one and a half hours. Next day, the patient having relapsed into a state of coma, 350 ounces were allowed to flow from a funnel into the veins of the leg. The patient recovered consciousness completely after three-quarters of an hour, but ultimately died. Within the space of thirty-two hours 456 ounces of saline fluid had been introduced into the veins. The *heart-sounds were feeble, but there was no murmur either in it or the great vessels.* And yet the blood must have been very hydræmic.

Further, in a case of pernicious anæmia lately under my care, in a boy aged sixteen, with lemon coloration of the skin and conjunctiva and abundant retinal hæmorrhages, and where the colored corpuscles fell at one time as low as 154,655 per c. m., the pulmonary systolic murmur was never loud and distinct, and was, during a great part of the time, difficult to catch.

*6. The characteristic of the so-called hæmic, pulmonary murmur is that, though audible frequently in all the areas, its point of maximum intensity is in the second or third left interspace (usually the second), close to the sternum; and that it invariably becomes much less loud, and frequently totally disappears in the erect position.*

In the early part of 1888, I was much surprised at the sudden disappearance of one of these pulmonary murmurs.

The patient was an anæmic maid-servant who had been admitted into the General Hospital, Nottingham, on account of syncopal attacks. There was well-marked dilatation of the heart, and a loud systolic murmur with its point of maximum intensity in the pulmonary area. The patient gradually improved, though the murmur did not alter much. She was allowed to get up. A few days later I examined the heart while the patient was standing. There was no murmur to be heard, and I congratulated myself and the patient on the rapid reëstablishment of a healthy cardiac state. A day or two later I happened to examine

the chest again before the patient got up. The murmur had returned, and was as loud as ever. The thought suddenly struck me that the variability of the murmur was due to the influence of position. I made the patient stand, and the murmur became inaudible. On lying down again, it returned at once.

Since that date I have made hundreds of observations to test this point, and have full records of between thirty and forty cases of anæmia in which this phenomenon has occurred.[1] And the result of my experience is that in all cases of anæmia in which the pulmonary systolic murmur is present, it becomes much less loud in the erect position, and that in the majority it either totally disappears or leaves only an impure or murmurish first sound which might easily escape observation; but that the murmur returns at once on the patient assuming the recumbent position.

It is sometimes accompanied by pulsation in the episternal notch, and almost always by pulsation in the second, third, and fourth intercostal spaces near the sternum. The murmur is intensified by raising the patient's hips or the foot of the bed. It is unchanged by turning the patient on the left side. The murmur generally becomes much fainter when the patient lies on the right side, and *disappears when she turns on the face.* On the patient standing the heart is apt to palpitate, or at least become unduly accelerated. Under these circumstances observations are difficult. The murmur usually disappears, or, should it remain, it becomes difficult to differentiate.[2] After a few minutes the heart usually quiets down, and then more accurate observations can be made. It has been noticed by several observers that these pulmonary murmurs usually disappear during full inspiration,[3] especially if the patient holds the breath. An explanation of this will be suggested later. It is the contrary of what usually happens in apex-murmurs.

*7. This pulmonary systolic murmur, disappearing in the erect position, is due to the pressure of an enlarged, flabby, and dilated heart on the pulmonary artery.*

1 Gee says: "Murmurs audible in the horizontal position sometimes become much less loud and long in the erect—nay, occasionally altogether cease. This is most frequently the case with presystolic murmurs produced at the mitral orifice. The reason of the occurrence is not quite clear. I have not been able to find any statement in the text-books that this applies especially to the pulmonary, so-called hæmic, murmurs. Nor can I ascertain that such a view is at present the teaching of the schools. In fact, singularly little practical importance seems to be attached to the 'influence of position on cardiac murmurs,' although several monographs have been written on the subject."

2 Gee states: "Murmurs are loudest sometimes when the heart beats forcibly, sometimes when it beats quietly."

3 Gee says: "The loudness of murmurs is sometimes under the influence of breathing; thus, a systolic apex-murmur may be much louder during inspiration than during expiration.

On thinking over this strange variability of the anæmic pulmonary murmur, according to the position of the patient, a variability not found with anything like the same frequency or to the same degree in other murmurs, even the presystolic, it seemed to me that the only possible explanation of the murmur disappearing in the erect and in the prone positions, was that it was caused by the pressure of the heart—especially of an enlarged and flabby heart—on the pulmonary artery. This pressure may be increased somewhat during the systole by the "base-beat." I suppose the pressure to be communicated chiefly through the fibrous ring surrounding the orifice of the pulmonary artery. The counter-pressure would be partly the general fixity of the pulmonary artery by the passage of its branches into the roots of the lungs, and partly the arch of the aorta, in which the vascular tension is higher and therefore the vessel firmer, and which is held in position by the large branches coming off from it and by the general connective-tissue investment, This view somewhat resembles Russell's theory, with which I was unacquainted at the time, but the points of difference will be explained later on.

The explanations of the cardiac murmurs of anæmia have been many and various.

Marey supposed these bruits to be due to a diminution of arterial tension facilitating the production of sonorous veins at the arterial orifices. Clinical medicine convinces us that diminution of arterial tension is not sufficient to account for the production of a murmur; and, moreover, in many of these cases of anæmia we have seen that the arterial tension is raised.

Naunyn's theory, adopted by Balfour, is that the murmur is due to regurgitation through the mitral orifice into the left auricle, and that the point of maximum intensity of the murmur is not over the pulmonary artery, but one and a half inches or more to the left of the left edge of the sternum, where the appendix of the left auricle comes up from behind. In my own experience the point of maximum intensity has been, in the majority of instances, over the pulmonary artery, or over the conus arteriosus near the sternum, and not so far to the left as described by Naunyn and Balfour. I am not satisfied that there is any sufficient evidence that the left auricular appendage, unless in very exceptional instances, does come into contact with the chest-wall, but I believe as far as my own observations guide me, that in the vast majority of cases it is covered by lung. And, furthermore, the dilatation of the right ventricle so common in anæmia tends to push the left auricle still more to the back. But the strongest ground of all for rejecting this theory is, that in no small proportion of cases a systolic murmur, differing in character from the pulmonary one, can be heard at the apex, and is propagated for one or two inches toward the axilla, while the pulmo-

nary murmur is audible in the usual position at the same time. The pulmonary murmur disappears on the patient standing erect, the apex murmur does not. And in many cases, after suitable treatment by rest, etc., the apex murmur disappears even in the horizontal position, while the pulmonary murmur remains for some weeks longer. This seems to me sufficient evidence of the independence of their causation. There can be little doubt that the apex murmur is due to regurgitation through the mitral orifice, in some cases from shrinking of the valve from valvulitis; in most, probably, from dilatation of the orifice, or from inefficient contraction of the muscles of the base (McAlister), or from general relaxation of the muscular tissue. In these cases, at any rate, the pulmonary murmur must be explained by some other cause, for it is unreasonable to suppose that regurgitation through the mitral orifice can produce two different murmurs at the same time, heard best in different areas, propagated in different directions, and one disappearing while the other remains.

Broadbent traces the cause of these murmurs to high arterial tension, owing to which the ventricle is unable to empty itself, and hence dilatation follows.

Bristowe (*Proceedings of the Medical Society of London*, vol. xi., 1888), speaking of the "murmurs often termed 'hæmic,' which are generally best heard about the sternal end of the cartilage of the left third rib," says:

"How it is caused I do not pretend to decide. That it is directly due to altered quality of the blood I do not in the least believe. I should think it is connected with some want of due relation between the quantity of blood expelled from the ventricle in a given time, and the size or tension of the pulmonary artery, allowing of the development of coarse vibrations of the contents and walls of that part of the circulatory apparatus over which it is best heard."

Russel, while not disputing that the murmur heard in a large proportion of cases of debility, due to causes such as chlorosis, fevers, and parturition, is excited by mitral regurgitance owing to laxity of the ventricular walls, yet denies that its mechanism as expounded by Balfour is correct. It is not generally heard at the apex, the point where mitral murmurs are usually loudest, and it has not the purely soft blowing character of a murmur arising in this neighborhood. It also gradually disappears during inspiration. He explains its mechanism rather on the assumption that the left auricle becoming distended from the mitral regurgitation, presses injuriously on the pulmonary artery, and throws its blood into a state of sonorous vibration.

To this theory it may be objected that there is no evidence that the left auricle is distended in all the cases of anæmia in which the pulmo-

nary murmur is distinct. As I have said before, in very many cases there is no apex murmur at any time, and in others it disappears before the pulmonary. In a large number of cases, therefore, the pulmonary murmur has to be explained in the absence of any evidence whatever of regurgitation through the mitral valve, and consequent distention of the left auricle. And in the very large number of cases of chronic heart disease from incurable mitral regurgitation this murmur is not present, notwithstanding that one may be assured that the left auricle must be dilated.

Furthermore, in mitral stenosis, when the left auricle is greatly distended, a systolic murmur in the pulmonary area, or in the third space, is exceptional.

Balfour says:

"Not unfrequently, a systolic murmur with its point of maximum intensity in this situation (*i. e.*, an inch to the left of the left edge of the sternum in the second space) is due to the regurgitation almost always present in mitral constriction, many circumstances favoring in these cases the convection of this murmur upward to what we may term the auricular area, rather than its mere reduction outward into what is termed the mitral area. These being the great dilatation of the appendix auriculi, and the concomitant tendency of the left apex to become depressed within the chest by the distended right ventricle, which, in all these cases, is usually more or less *dilated*."

I believe that this murmur is not due to regurgitation through the mitral orifice, but to the dilatation of the right ventricle already alluded to, and to the weight and base-beat of the heart pressing on the pulmonary artery.

Balfour relates the case of a man with mitral stenosis, in whom there was a presystolic murmur audible at the apex, and a loud, rough systolic murmur in the pulmonary area. The systolic bruit became always very faint, and occasionally inaudible; on the patient assuming the erect posture, the presystolic bruit remaining unchanged. And he suggests that this was possibly because in this position the necessary compression of the pulmonary artery was prevented by the heart's weight dragging it down.

Quincke,[1] of Berlin, has related a case of mitral stenosis in which a pulmonary systolic murmur was present. He attributed it to hypertrophy without dilatation of the right ventricle, together with dilatation of the pulmonary artery, the murmur arising at the orifice of the pulmonary artery from the formation of a fluid vein. In this case the auricular appendix was thrombosed and lay deep in the chest; the

[1] Balfour, p. 197. I have had no opportunity of referring to the original, Beiträge zur Enstehung der Herztöne und Herzgeräusche, Berliner klin. Woch., 1870, No. 21, S. 249.

auricular origin of the murmur from convection was therefore precluded. But the thrombosed auricular appendix would from its position readily become an instrument for compressing the pulmonary artery, especially when in the recumbent position a portion of the weight of the heart was communicated to it. I believe in this, as well as in the next series of cases related by Quincke, the essential condition is the dilatation of the right ventricle, and that the murmur is produced in some instances, perhaps, by the consequent *relative* stenosis of the pulmonary orifice; but in the majority by the actual stenosis of the pulmonary artery produced by the weight and upward pressure (base-beat) of an enlarged and flabby heart, communicated to the pulmonary artery through the fibrous ring surrounding the arterial orifice. All the conditions for this were present in Quincke's cases. Most of them were associated with debility. There was visible pulsation in the second left interspace, and there was an increase of the absolute cardiac dulness, which diminished *pari passu* with the disappearance of the pulmonary bruit. The murmur, too, disappeared when the pulmonary artery again became covered by lung, just as in chlorosis the murmur disappears during full inspiration. Quincke states that the systolic pulmonary murmur is accompanied by an uncovering of the base of the heart by retraction of the left lung from various causes, and he supposes that in these cases the systolic murmur is produced by compression of the pulmonary artery by the heart during its systole. The murmur is caused by the passage of the blood through the compressed and narrowed portion of the artery into the uncompressed and therefore comparatively dilated portion beyond, a state of matters which must be accompanied by the production of fluid veins at the part artificially narrowed; and which, therefore, if it exists, must be regarded as an efficient physical cause for the production of a systolic murmur. He bases his views as to the possibility of the production of this artificial narrowing, first, upon the fact that the pulmonary artery could in all these cases be felt and seen to pulsate. Quincke attributes much importance in these cases to the "uncovering of the base of the heart by retraction of the left lung from various causes." And Balfour emphasizes this still more in his cases. He says:

"Now you will observe that all these cases agree in this, there was in every one of them retraction of the left lung, and uncovering of the heart and pulmonary artery, the exposure of the latter permitting its pulsations to be readily seen and felt. . . . The uncovering of the pulmonary artery also brings the valves nearer the surface; hence their closure is not only more easily felt, but also more easily heard."

This explains the *normal* sounds being more loudly heard, but does not account for the production of a murmur. I believe that in anæmia the uncovering of the heart and pulmonary artery, so far as it occurs, is

due to the lung being pushed away by the enlarged heart. Where the lung is retracted from disease of its own tissues the heart gets more room, and is allowed more play, and hence without being enlarged or dilated may, in the recumbent position, fall back and press on the pulmonary artery sufficiently to cause a murmur. On this theory the disappearance of pulmonary murmurs, when the breath is held after a full inspiration, would be only partly due to imperfect conduction of the murmur from the heart and pulmonary artery being well covered by expanded lung, but largely also to the heart being better supported by the increased size and increased tension of the pulmonary air-cushion, and prevented from falling back.

Balfour speaks of the "auricular murmur as of such frequent occurrence in all febrile disorders, depending upon a slight degree of cardiac dilatation, and this has been occasionally, though rarely, accompanied by a murmur of similar origin audible in the mitral area." That febrile, or post-febrile cardiac dilatation should lead to a regurgitation through the mitral orifice causing a systolic murmur with its point of maximum intensity sometimes in the auricular area, and sometimes at the left apex, and sometimes equally audible in both, requires further explanation. The fact that these murmurs are heard as described is beyond question, but it seems much more reasonable to attribute the auricular (pulmonary?) murmur and the apex one to different and independent causes, as they are shown to be audible independently. I prefer to suppose that the so-called auricular murmur is in reality pulmonary, and that it is due to pressure on the pulmonary artery.

In further support of the opinion that these pulmonary systolic murmurs are produced by pressure on the pulmonary artery, I may refer to the widely-recognized fact that in certain instances of pleuritic effusion a basic systolic murmur is produced by the pressure of the fluid. Dr. Douglas Powell (*Diseases of the Lungs*, pp. 82, 83) thus describes it: "In cases in which the heart is greatly displaced by pleuritic effusion a systolic murmur is developed over its base, which disappears on removal of a portion of this fluid, and is presumably due to a straightening or slight tension of the great vessels from pressure of the fluid."

And as an example of the production of just such a murmur as we are considering, by direct pressure upon the pulmonary artery, I may refer to a case of "Aneurysm of the Aorta opening into the Pulmonary Artery" which I reported in the *Edinburgh Medical Journal*, February, 1888, which affords almost an experimental proof of it. In this case the pulmonary artery was pressed upon half an inch above the valves by a small aortic aneurism, which eventually communicated with it. Here there was marked pulsation in the third left intercostal space from the dilated conus arteriosus of the right ventricle and a loud systolic murmur. This was noticed before there was any ground for supposing

that the opening of communication had formed, but while there was only pressure.

Before, however, this theory of the causation of the pulmonary systolic murmur by the pressure of an enlarged heart upon the pulmonary artery in the recumbent (supine) position can be accepted, it is necessary to show whether variations in bodily position influence the position and movements of the heart in the thorax. That is to say, whether the influence of gravity upon the heart does affect its pressure on neighboring organs. "In the healthy man, in the erect or sitting position, the heart, of course, lies on the diaphragm, suspended, however, a little by its base, which is attached by the great vessels and the structures of the spinal column. Owing to this arrangement of the parts it would seem, therefore, probable that variations in bodily position, or in the position of the diaphragm, might act through gravity upon the suspension of the heart, either lengthening it by allowing it to fall from its attachment, or shortening it by pushing it up and back, as it were, on its base." It is, of course, well known that the force and position of the apex-beat vary considerably in different positions of the body. But the influence of the position of the body on the position of the heart has been best shown by Mr. C. J. Bond, F.R.C.S., in some experiments both on the lower animals and on himself, a report of which was published in the *British Medical Journal*, December 12, 1885. By passing down the œsophagus an air tampon, connected by a tube with an air tambour and a recording apparatus, he was enabled to obtain tracings of the "base-beat" of the heart; and to show that it varied greatly in different positions of the body, and during inspiration and expiration. In describing a tracing taken while the tampon was in his own œsophagus, he says: "The smaller frequent rises (due to the cardiac beats) are more marked during expiration than inspiration, owing to the heart falling back toward the spine during expiration; further, these cardiac curves are very marked, especially on the summits of the expiratory rise at the left end of the tracing, while I was lying on my back with the head and shoulders depressed, and legs and pelvis raised, while they almost disappear in the sitting-up and prone positions, to reappear at the right-hand end of the tracing in the supine position."

In the next place, if the pressure theory has any foundation, why is not this pulmonary systolic murmur present in all cases of enlargement of the heart? In reply to this, I must say that a full explanation is wanting, but that it is present in some cases. I conceive a predominant dilatation of the right ventricle to be necessary, a condition not common in chronic heart disease. I have already mentioned that a systolic murmur with its point of maximum intensity in the second or third space, is not unfrequently audible in mitral stenosis—an affection which entails dilatation of the right ventricle, and not of the left.

I have also found it in the following case, which is typical of a class:

A man, aged forty-eight, has been under observation at frequent intervals during the past three years. He has chronic Bright's disease and a dilated (? fibroid) heart. When compensation fails, and he gets dropsy and cardiac symptoms with very rapid heart's action, a systolic murmur over the right and left ventricles is constant, and he has orthopnœa. When the heart is rehabilitated, and its speed reduced to seventy, the murmur disappears. Now he is just recovering from his fourth attack of failure of compensation, but the right side (and probably the left also) is considerably dilated. The cardiac dulness extends far to the right of the sternum, the jugulars are extremely turgid, pulsate with the heart-beats, and fill from below. The speed of the heart has been reduced to between eighty and ninety, but it is still irregular. In the erect position there is no trace of a murmur. In the recumbent position a systolic murmur is constantly audible, with its point of maximum intensity in the pulmonary area. This has been confirmed by several observers.

In cases of chronic valvular disease the changes are complex; the left side is generally more enlarged than the right, and may prevent pressure on the pulmonary artery by transferring the weight of the heart to the aorta. Possibly, too, a certain degree of relaxation or flabbiness of the heart-muscle is required. When the left ventricle is considerably hypertrophied, and is firm and rigid, the much smaller right is more like an appendage to it, and cannot in the recumbent position fall back and press on the pulmonary artery.

As examples of the unfavorable influence of the dorsal recumbent position on the heart, where there is no suspicion of orthopnœa, I may quote the following, both of which have recently been under my observation:

A man, tall, thin, aged thirty-four, with a faint apex systolic murmur, and the heart's action regular and of normal speed, has some cardiac pain; but is able to take active exercise and ride a bicycle. When he sleeps on his back he frequently wakes suddenly with urgent dyspnœa, and cardiac pain and distress.

A very stout, short man, aged fifty-two, with regular heart's action and no murmur, suffers from anginal attacks on walking up hill. If he lies on his back, cardiac pain always comes on within a few minutes, and continues until some time after he has turned on the right side, or has sat upright, or leaned forward, which latter position is the easiest.

Possibly, too, the distress and somewhat rapid fatal termination in sheep that are "cast," is due to the pressure on the heart from the dorsal position.

*8. By this test of position the pulmonary murmur, when loudly audible in the other areas in the horizontal (supine) position, can be distinguished from true regurgitant murmurs due to relaxation of the heart-muscle, or dilatation of its openings, or valvulitis.*

*9. When in anæmia there are murmurs in all the areas, not due to permanent changes, they disappear during convalescence in a definite order, namely: first the tricuspid, next the mitral, then the aortic, and lastly the pulmonary.*

With judicious treatment the murmurs, except the pulmonary, may cease in a fortnight to six weeks; but the pulmonary murmur, though less loud and distinct than heretofore, is generally audible in the horizontal, supine position for several weeks, and sometimes months, longer, notwithstanding an increase of weight on the part of the patient seven to fourteen pounds or more, and a corresponding improvement in color and general condition.

*10. And lastly, it is probable that in some cases anæmic enlargement of the heart leads to permanent heart disease.*

In order to learn whether anæmic enlargement of the heart ever leads to permanent heart disease, it is necessary to keep the cases under observation for some years, and that I have not been able to do. Of two cases that I have been able to examine at the end of two years or more, one had a permanent aortic systolic murmur, and the other a mitral systolic, but the pulmonary murmurs had gone. There was slight enlargement. It is not improbable that if more cases could be followed out permanent alterations would be found to be more common. Dr. Goodhart has suggested that there may be some connection between the great predominance of mitral stenosis in females, and the heart-changes of anæmia. He says: "Anæmia, by the dilatation it sets up, and the regurgitation through the mitral valve, may be the etiological factor in the unexplained considerable minority of cases of mitral stenosis in women which cannot be attributed to rheumatism."

*11. Treatment.*

If the importance and extent of the heart-changes are recognized the treatment is not difficult. It may be summed up in a few words: Rest, food, aperients, iron. Complete rest in bed for a week or ten days, with half the day in bed for another week or fortnight, is a therapeutic measure of great value. The dietary has generally been deficient in albuminoids. Saline aperients appear to answer best. I do not believe digitalis to be necessary except when the heart's action is too rapid even during rest, and in those cases which have to be treated without the possibility of rest. In the latter, better results may be obtained with digitalis and iron than by iron alone.

# THE TREATMENT OF INFLAMMATIONS OF THE MASTOID,

## WITH AN ANALYSIS OF EIGHTY OPERATIONS.

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In the following paper I have made an analysis of eighty cases in which the mastoid was opened by me for inflammation, and of which I have notes; fifty-five of these have occurred within the last two and a quarter years. The notes of many others which I should have been glad to add have been lost from lapse of time or are buried beyond recovery in hospital records. These latter have played an important part, however, in my experience, and it is only proper to say here that my conclusions are based upon about two hundred and fifty operations. The cases here reported are not selected, but include every one which I can now recall.

I have included only cases in which the mastoid was opened for inflammation; cases of malignant disease are omitted.

The cases are readily divided into four distinct classes, based upon the external manifestations of the disease upon which our diagnosis and treatment must depend, and these classes are again subdivided according to the existing pathological conditions as determined at the operation.

Class I. includes cases in which there was no extension of the inflammation to neighboring parts, neither œdema, swelling, nor redness; These I have called cases without extension. Pathologically they are subdivided into:

I. (*a*) Simple suppuration of the mucous membrane of the interior of the mastoid.
(*b*) Suppuration of the diploë of the bone.
(*c*) Caries and necrosis of the interior of the mastoid.
(*d*) Osteo-sclerosis.

Class II. embraces the cases in which there was an extension of the inflammation outward through the external cortex, with the subdivisions:

II. (*a*) Subperiosteal abscess, the cortex firm and imperforated.
(*b*) Caries of the cortex.
(*c*) Caries of the cortex and necrosis of the interior.
(*d*) Caries of the cortex and caries of the interior.

Class III. includes those cases in which there was an extension of the inflammation forward through the anterior wall of the mastoid which forms the posterior wall of the osseous meatus, the subdivisions being:

III. (*a*) Suppuration of the diploë of the bone.
(*b*) Caries of the cortex.

Class IV. includes the cases in which the inflammation extended downward through the base of the mastoid, subdivided into:

IV. (*a*) Subperiosteal abscess of the base of the mastoid, without caries of the cortex.

(*b*) Subperiosteal abscess of the base, with caries of the cortex.

(*c*) Cellulitis of the neck.

(*d*) Osteo-sclerosis of the bone without pus, either subperiosteal or intra-mastoideal.

(*e*) Phlebitis of the external jugular vein.

Two other classes of cases can be made on this same principle, although, as no instances occurred in this series, they do not appear in the tables.

Class V., including the cases of extension of the inflammation upward through the mastoid roof, subdivided into:

V. (*a*) Subdural abscess.

(*b*) Meningitis.

(*c*) Encephalitis.

Class VI., the extension of the inflammation inward through the inner wall of the mastoid, with the subdivisions:

VI. (*a*) Phlebitis and thrombosis of the lateral sinus.

(*b*) Subdural abscess.

(*c*) Meningitis.

(*d*) Encephalitis.

A number of the following cases exhibited two or more varieties of disease, which will account for some apparent discrepancies in the totals.

Adopting the above classification, I find of the 80 patients there were in:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Class I. | 11, | showing | 14 | pathological | phases | of | that | class. |
| II. | 51, | " | 58 | " | " | " | " | |
| III. | 5, | " | 5 | " | " | " | " | |
| IV. | 13, | " | 16 | " | " | " | " | |
| | 80 | | 93 | | | | | |

| | |
|---|---|
| Males | 41 |
| Females | 39 |
| | 80 |

Of 71 patients in which it is specified, the diseased mastoid was:

| | |
|---|---|
| Right side | 36 |
| Left " | 33 |
| Both sides | 2 |
| | 71 |

Of 79 patients, there were:

| | Males. | Females. |
|---|---|---|
| Under 3 years of age | 2 | 2 |
| Between 3 to 15 | 4 | 9 |
| " 15 " 25 | 9 | 15 |
| " 25 " 35 | 10 | 6 |
| " 35 " 45 | 4 | 4 |
| " 45 " 55 | 5 | 0 |
| " 55 " 65 | 4 | 2 |
| " 65 " 75 | 3 | 0 |

Of the 80 patients, there were:

| | |
|---|---|
| Cured | 62 |
| Not cured | 3 |
| Died | 7 |
| Unknown | 2 |
| Unfinished | 6 |
| | 80 |

The two unknown cases have imperfect histories, so that I cannot speak positively of them.

I have designated as cured those cases in which the mastoid healed perfectly, and in which no symptoms in the mastoid remained, and where the general health was perfect. In the greater part of them the otorrhœa was also cured, but, unfortunately, this fact was not as thoroughly reported as it should have been, and I am unable to give the statistics in this regard. The result on the hearing is also not reported here, but this has no bearing on the operation, but is rather dependent upon the condition left by the tympanic disease, the amount of destruction of the drum-membrane, the restoration of this destruction, the condition of the rest of the conducting mechanism, and the efficiency of the labyrinthine structures. In no case have I seen any reason to believe the operation had any injurious influence on the hearing; and in most cases, by reducing the inflammation of the tympanum, the ear was placed in the most favorable condition for performing its functions, so far as the already existing injuries of the acoustic apparatus would allow.

I have called those cases chronic in which the mastoid symptoms, not the tympanic, had existed for two months or more.

A classification of all the cases follows:

| | | | Acute. | Chronic. | Cured. | Not cured. | Died. | Unfinished. | Unknown. |
|---|---|---|---|---|---|---|---|---|---|
| Class I. | a, | 5 | 5 | 0 | 5 | 0 | 0 | 0 | 0 |
| | b, | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| | c, | 2 | 0 | 2 | 0 | 0 | 0 | 2 | 0 |
| | d, | 6 | 2 | 4 | 3 | 0 | 1 | 2 | 0 |
| | | 14 | 8 | 6 | 9 | 0 | 1 | 4 | 0 |
| Class II. | a, | 4 | 4 | 0 | 4 | 0 | 0 | 0 | 0 |
| | b, | 44 | 31 | 10[1] | 36 | 3 | 2 | 3 | 0 |
| | c, | 6 | 2 | 4 | 6 | 0 | 0 | 0 | 0 |
| | d, | 4 | 2 | 1[2] | 1 | 1 | 1 | 1 | 0 |
| | | 58 | 39 | 15 | 46 | 4[4] | 3 | 4 | 0 |
| Class III. | a, | 2 | 2 | 0 | 1 | 0 | 1 | 0 | 0 |
| | b, | 3 | 2 | 1 | 1 | 0 | 2 | 0 | 0 |
| | | 5 | 4 | 1 | 2 | 0 | 3 | 0 | 0 |
| Class IV. | a, | 4 | 2[3] | 0 | 4 | 0 | 0 | 0 | 0 |
| | b, | 7 | 7 | 0 | 6 | 0 | 0 | 1 | 0 |
| | c, | 3 | 3 | 0 | 3 | 0 | 0 | 0 | 0 |
| | d, | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| | e, | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| | | 16 | 14 | 0 | 15 | 0 | 0 | 1 | 0 |

Three cases were not cured; in all of them caries and an open fistula remained; although all urgent symptoms, the original cause of the operation, were relieved. In one of these, No. 19, the treatment was broken off within four weeks after the operation from unavoidable causes; in another, No. 58, a cholesteatomatous mass formed, requiring a second operation, which the patient refused; in the third, No. 43, in spite of long-continued treatment, caries still exists and will probably require a second operation.

Of the 7 cases which died, 5 had active brain symptoms at the time of operation, 1 had bilateral mastoiditis with evident subperiosteal abscesses on each side, but refused operation for eighteen days, till too late, and died of meningitis; 1 died eleven days after operation from purulent meningitis, probably septic from acute caries of the whole petrous bone. Autopsies were obtained in two of the cases, and the diagnosis of meningitis confirmed; in four others the symptoms of meningitis were so pronounced that there was scarcely room for doubting the diagnosis; in the last case the symptoms rather pointed to abscess of the brain.

It can be asserted of 5 of the 7 fatal cases, that the brain-disease had already set in at the time of operation, and the operation was undertaken to give the patient any possible benefit from the evacuation of pus. In the sixth case the operation was delayed for two and a half weeks, notwithstanding warning of the great risks of delay. In the seventh case

[1] Unknown whether acute or chronic, 3.
[2] " " " " 2.
[3] Unknown whether acute or chronic, 1.
[4] One case is duplicate.

the whole petrous bone was in a state of acute ostitis, which finally infected the meninges, death being due to very intense purulent meningitis, which set in eleven days after the operation.[1] In none of the cases can the fatal result be connected with the operation.

The classification of the fatal cases was as follows:

| | | | |
|---|---|---|---|
| Class I. (*d*) | . . . . | 1 acute. | |
| Class II. (*b*) | . . . . | 1 " | 1 chronic. |
| (*d*) | . . . . | | 1 " |
| Class IV. (*a*) | . . . . | 1 " | |
| (*b*) | . . . . | 1 " | 1 " |

Of the unfinished 6 cases, 3 are cured since these statistics were compiled, and the other 3 are doing perfectly well, now several weeks since the operation.

There are several practical questions in connection with the operation which it is of interest to investigate. Granting that suppuration within the bone endangers the integrity of the bone and the life, and that the evacuation of pus is indicated on general surgical principles, in what proportion of the cases was pus found?

| | No. of cases. | Pus. | No pus. | Cortex normal. | Osteo-sclerosis. |
|---|---|---|---|---|---|
| Class I. *a*, | 5 | 5 | 0 | 3[2] | 1 |
| *b*, | 1 | 1 | 0 | 1 | 0 |
| *c*, | 2 | 2 | 0 | 0 | 2 |
| *d*, | 6 | 4 | 2 | 0 | 6 |
| Class II. *a*, | 4 | 3[2] | ... | 4 | 0 |
| *b*, | 44 | 44 | 0 | 42 | 2 |
| *c*, | 6 | 6 | 0 | 5 | 1 |
| *d*, | 4 | 4 | 0 | 4 | 0 |
| Class III. *a*, | 2 | 2 | 0 | 2 | 0 |
| *b*, | 3 | 3 | 0 | 3 | 0 |
| Class IV. *a*, | 4 | 4 | 0 | 3 | 1 |
| *b*, | 7 | 6[2] | ... | 5[2] | 1 |
| *c*, | 3 | 3 | 0 | 2 | 1 |
| *d*, | 1 | 1 | 0 | 0 | 1 |
| *e*, | 1 | 1 | 0 | 1 | 0 |
| | 93 | 89 | 2 | 75 | 16 |

The two cases in which no pus was found were both cases of osteo-sclerosis.

One of the complications occasionally met with is a sclerosed condition of the bone, where, instead of a thin cortex, the bone is enormously thickened and solidified, which much increases the difficulty of reaching the antrum and the risk of accidents. In the 80 cases I met with this con-

[1] Reported in the Boston Medical and Surgical Journal, May, 1890.

[2] Unknown, 1.

dition in 12 individuals, showing 16 varieties of disease. A further analysis of these 12 cases follows:

| | Acute. | Chronic | Cured. | Died. | Unfinished. | Antrum reached. | Antrum not reached. | Pus | No pus. |
|---|---|---|---|---|---|---|---|---|---|
| Class I. $a_1$ | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| $c_1$ | 0 | 2 | 0 | 0 | 2 | 1 | 1[2] | 2 | 0 |
| $d_1$ | 4 | 2 | 3 | 1 | 2 | 5 | 1[2] | 4 | 2 |
| Class II. $b_1$ | 1 | 1 | 2 | 0 | 0 | 2 | 0 | 2 | 0 |
| $c_1$ | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| Class III. $a_1$ | 1[1] | ... | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| $b_1$ | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| $c_1$ | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| $d_1$ | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| | 10 | 6 | 11 | 1 | 4 | 14 | 2[2] | 13 | 3 |

In three cases of sclerosis no pus was found. In one the antrum was not reached, but after penetrating to the depth of nine-sixteenths of an inch without reaching any cavity, further penetration seemed undesirable, and the opening was extended forward into the tympaneum, where extensive caries existed, and a counter-opening was thus made, the caries removed by the dental engine, and now, two months after the operation, all exposed bone is covered, and the discharge has ceased. The case is included among the unfinished cases. In the second a purulent inflammation of the tympanum, with large central perforation, had been accompanied for two years with sensitiveness on pressure, with much, and often severe, pain in the mastoid and head, with frequent vomiting, vertigo, and great nervousness, which continued in spite of thorough and appropriate treatment. At the depth of five-eighths of an inch, through ivory-like bone, without a trace of pneumatic or diploëtic cells, the antrum was opened, but no pus was discovered. The case progressed most favorably, the pain disappeared in a week, and has not returned, now five months after the operation, the otorrhœa soon ceased, and the perforation healed. As there is still slight sensitiveness of the bone, this case also is included among the unfinished. In the third there was an extensive non-suppurative cellulitis of the neck; the antrum was opened at the depth of more than half an inch, but no pus found. The patient was relieved within a few days, and made an excellent recovery both from the ear and from the neck.

General Remarks.—Diseases of the mastoid afford most interesting studies of all forms of inflammation of bone, but some of the varieties which I have made in the foregoing classification offer very much greater difficulties in diagnosis and treatment than others.

[1] Unknown whether acute or chronic, 1.

[2] One case, which is classified under both *c* and *d*.

Class I., 13 per cent. of all the cases, raises the question of the advisability of the operation where there are absolutely no symptoms pointing to an extension of the inflammation, and I believe that in this class particularly it is possible to greatly extend the usefulness of the operation for the relief of suffering, reduction of the inflammation of both the mastoid and the tympanum, and for diminishing the risks of dangerous and fatal complications. In all the cases, with the exception of the one fatal, and which showed meningitis at the time of operation, the relief was most marked, and, as I believe, the inflammation shortened very much. The fact that in twelve of the fourteen cases pus was found within the bone fully justifies the operation on general surgical principles. The unusual proportion of cases of sclerosis, eight of the fourteen, suggests that this condition helps to explain why there was no extension of the inflammation.

Class II. embraces 69 per cent. of all the cases. In variety (*a*) very much the same questions arise as in Class I., except that the subperiosteal pus is proof positive of the existence of inflammation. But shall we go further than the evacuation of the post-aural process? I grant that in many acute cases the simple evacuation of the subperiosteal abscess is sufficient for a slow cure of the mastoid and tympanic disease, but I have so often seen the external abscess followed later by a carious perforation of the bone that I am satisfied in the majority of these cases in adults it is better practice to open the interior cavities at the time of the first operation. In all of the cases in which I have done so I have found pus, and the ultimate result has justified the procedure. The opening of the cells, in addition to the evacuation of the subperiosteal abscess does not, in my opinion, increase the risks, but rather will hasten the cure of the whole inflamed tract, and prevent in many cases dangerous complications, or a second operation. The only theoretical objection is the violence done to the bone; but the bone is already inflamed, and in many cases will be perforated ultimately by the disease. Furthermore, the bone is, in my experience, thin in these cases, and the very existence of the subperiosteal abscess from extension of the mastoid inflammation outward seems to imply a thin cortex—at least, I cannot recall one of these cases in which I have found sclerosis.

Very acute cases of this variety in young, healthy children do so well, however, after emptying the subperiosteal abscess, that in them I regard the opening of the bone itself as less distinctly indicated than in other cases.

The simplest cases are, of course, those in Class II. (*b*), where the inflammation extends outward, producing a carious fistula, which serves as a guide to the surgeon in entering the cavities. This variety includes the majority of cases, 44 out of 93, or 47 per cent. Such a carious fistula does not, however, imply a great amount of inflammation of the external

soft parts, or any collection of pus beneath the periosteum. In a number of cases an exposure of the bone has demonstrated such a fistula where œdema and swelling of the overlying tissues were absolutely wanting. In other cases swelling and œdema were very circumscribed and intermittent, appearing for one or two days, then disappearing entirely for several days or longer, to again return for a short time, and then again disappear. This intermittent œdema and swelling is a marked characteristic of some cases of carious perforation of the external cortex, and I believe I have never operated on such a case without finding the perforation. This class, II. (*b*), is the only single variety which affords a large number of cases; all the others are scattered in small numbers under the different headings.

In varieties (*c*) and (*d*) there can be no question, I think, of the advisability of the operation to get at and treat surgically the disease of the bone.

Class III., 20 per cent. of all the cases, I have regarded heretofore as the most serious of all varieties, except the extensions into the cranium. The extensive burrowing of pus downward and backward, beneath the deeper cervical fascia, even to penetration of the pleura or caries of the vertebra, was by no means an uncommon history formerly, before the natural history of mastoiditis was understood. In view of my own experience and that of others, years ago, the present statistics are very gratifying, showing thirteen cases of this class, with twelve recoveries, and one unfinished, but now nearly well. None of these, however, were of the severest type, which we formerly used to see, and all were operated upon before the inflammation had extended far in the neck, and the further extension of the inflammation was checked.

Varieties (*a*) and (*b*) correspond exactly with the same varieties in Class II., except that the base of the mastoid is the seat of disease instead of the external cortex, and there is apt to be a collection of pus, usually small in amount, beneath the periosteum of the base, in or near the digastric fossa.

Variety (*c*) is an extension of inflammation to the tissues of the neck for a greater or less distance.

All cases of this class offer difficulties in the method of operating. There is very free bleeding from the inflamed tissues, and the pus, if small in amount, as is usual, may lie wholly beneath the periosteum, behind the tip of the mastoid. It is my practice to reach it by exposing the external cortex, then with a director bent to an appropriate curve to go round beneath the periosteum, usually behind the edge of the mastoid, but occasionally in front, and thus evacuate the pus and examine the base of the bone. If this is carious I remove all softened bone, extending my original incision by such a cross-cut as will allow me to insert a straight drainage-tube upward into the cavity. By this means

fair, but only fair, drainage is established. It is impossible to break down the partitions of the cells, and thoroughly cleanse the mastoid cavity. On these accounts I believe it better to follow with an opening of the external cortex, where, in most cases, more pus will be found. We thus obtain an opening and counter-opening, by means of which thorough cleanliness can be maintained. When inflammation of the neck is already developed a further opening may be required two or three inches below the bone, and I have inserted a drainage-seton through the external cortex, down through the bone into the digastric fossa, and brought it out four inches below the tip of the mastoid, with the result of a rapid cure of the mastoiditis and cellulitis of the neck.

Class IV. includes but 6 per cent. of the whole number of cases. In variety (*a*) there was pus beneath the periosteum of the anterior face of the mastoid, but no perforation of the cortex anywhere; the external cortex was then opened and pus found in the diploë. In variety (*b*) there was a distinct carious perforation of the anterior wall of the mastoid, which was enlarged externally till a drainage-tube could be inserted into the antrum. This class furnishes a much greater percentage of deaths than any of the other classes, 3 deaths out of 5 cases, while all the other classes together gave but 4 deaths in 74 cases. Why this should be so is not clear.

Diagnosis of Inflammation of the Mastoid.—The symptoms I have relied upon are, first, the history of an existing or preceding tympanic inflammation, in the majority of cases attended by an otorrhœa, but not always, for the discharge may be so slight as to escape observation, or, in exceptional cases, there is no rupture of the drum-membrane and consequently no discharge. Again, the tympanic inflammation may have wholly subsided and the inflammation of the mastoid developed weeks afterward. Of such instances I have seen quite a number.

Of the subjective symptoms, pain in the mastoid and over the side of the head are very common. Objectively, sensitiveness of the bone on pressure I regard as the most important single symptom. This sensitiveness must be looked for carefully; it is often only developed on deep pressure of the bone, and may be very limited in extent and on any part of the mastoid, although most frequently found over the antrum. Exceptionally it is wholly wanting, and the other symptoms have to be relied upon for the diagnosis. Œdema of the upper posterior wall of the meatus close to the drum-membrane, when it exists, is an almost certain indication of mastoid inflammation; it is characteristic of inflammation of the antrum, however, and where the inflammation is chiefly in the lower portion of the mastoid cavities it may be wholly wanting, and consequently its absence does not preclude mastoid disease.

Œdema of the external tissues is the most common indication that pus is forming beneath the periosteum, but this is by no means always

the case. It may exist without pus, may continue for a long time without pus, and even subside without any suppuration under the periosteum or any external caries of the bone. It is an indication of extension of the inflammation only to the overlying tissues, and we may have it from simple ostitis.

Of the 12 cases in which osteo-sclerosis was found, œdema of the skin over the mastoid was present in 5, and in 2 of these no pus was found either in the diploë or in the cells. Subperiosteal pus may exist without œdema over it, and caries even without any external manifestations.

Fluctuation I find a very uncertain symptom; the pus is so confined and the tissues over it often so swollen that it cannot be detected, and again, the œdema is not infrequently so great that it gives a sense of fluctuation by which the most expert may be deceived.

Another very important symptom of mastoid inflammation is the continuance of a tympanic suppuration in spite of thorough and persistent cleansing and rational treatment, when no other cause for the chronicity can be discovered, such as granulations or tympanic caries.

The pulse and temperature are, of course, a valuable assistance in many cases; this is especially true of the very acute forms attended with rapid and profuse suppuration, but in the less acute varieties and just in the cases where there is the most doubt in diagnosis they are often of no value whatever, remaining normal throughout the disease.

A diagnosis of the exact condition previous to operation I find impossible in a large proportion of cases. One can speak quite positively of the existence of inflammation, but whether the operation will develop a subperiosteal abscess, caries of the cortex or interior, an ostitis without suppuration, or a suppurative osteo-myelitis, is often uncertain. The operation is equally indicated and beneficial in either condition. I find it also impossible to predict beforehand the anatomical condition of the mastoid, whether pneumatic, diploëtic, or sclerosed; a large well-developed bone is more likely to be pneumatic than a small one. I have supposed that the duration of inflammation helped afford a clue to the condition, sclerosis being more probable in a chronic case than in an acute one. These statistics seem to support this view, as I find that in 40 per cent. of my cases of osteo-sclerosis the mastoid symptoms were chronic, while of the whole number of cases but 24 per cent. were chronic. I have found sclerosis of the bone not at all infrequent in dissections, but whether we are justified in asserting that this is always the result of inflammation I do not feel sure. In operating it is certainly met with quite often in very acute cases, where we cannot get a history of any previous inflammation.

The amount of pus found in the interior of the bone varies very much in the different varieties of the disease; it is really abundant only in

cases of suppuration of the mucous membrane. In osteo-myelitis it is found only in the minutest quantities, and sometimes not at all; with caries and necrosis it is often so small in amount that it can easily escape notice in the free bleeding which takes place from the granulations.

METHOD OF OPERATING.—I have tried all the different methods, beginning with the small trephine, then various forms of boring instruments, reamers, chisels, and gouges, and the dental engine, but for the last three years have used the gouge and mallet for opening the bone, and the dental engine afterward to enlarge the opening, to remove irregularities of the bone on the interior, but more especially to clear off a carious surface on the interior, for which it is especially adapted by its rapid cutting and by the delicacy with which it can be manipulated. I have never seen any ill-effects from the engine, but I am always careful to use it for only a very short time on account of the heating, and never with drills but with burrs. Its use does away with much hammering and the resultant shock to the brain.

Unless nature has furnished a guide in the shape of a carious perforation which, when enlarged, will give sufficient drainage, I endeavor to open the antrum, following the rules laid down by Schwartze. A communication with the tympanum, as shown by the passage of fluid from the wound into the meatus or Eustachian tube, is, in my experience, rather the exception than the rule, but this fact was not carefully enough noted for me to speak of the actual proportion of cases in which it occurred. Although I am very glad to have it, I am satisfied in a large proportion of cases it is not necessary for the most perfect and rapid cure.

I have met with but one accident in the operation, in a case operated upon since these statistics were compiled. In a man I had perforated about half an inch through a sclerosed bone and was examining the depth of the wound with a blunt director, when it broke through a thin layer of bone, and this was immediately followed by a most profuse venous hæmorrhage, which I at first thought must come from the lateral sinus. Examination with a probe, however, detected bone in every direction in the opened cavity, and I think it was a case of enlarged diploëtic veins, which are spoken of by Schwartze as sometimes existing. The bleeding was so profuse that any further operation was impossible, the wound was packed with iodoform gauze, a pressure-bandage applied, and the patient is making a good recovery.

I have long since given up metallic drainage-tubes, and use only rubber. General antiseptic precautions are used, with abundant irrigation of corrosive sublimate 1 : 3000. The ear is dressed daily and irrigated with corrosive 1 : 3000 for several days, and then with 1 : 5000; generally within a few days all odor disappears, and when the discharge diminishes the dressing is made only every second day, rarely at longer intervals, on account of the risk of infection from the

inside. To stimulate granulations in bare bone I use iodoform, either in powder or ethereal solution.

Several times I have exposed the dura mater and lateral sinus in the removal of sequestra, but without any injurious effect.

The good effects of the operation are usually seen within two or three days, and often immediately in relief to the pain, and there is generally a rapid improvement in the tympanic condition, but the chief object, of course, is the prevention of extensive destruction and the fatal complications which are well known to often supervene.

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## SELF-PURIFICATION OF FLOWING WATER,

### AND THE INFLUENCE OF POLLUTED WATER IN THE CAUSATION OF DISEASE.[1]

(A BIOLOGICAL STUDY.)

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OF NEW YORK.

OUR watersheds being in great part composed of diluvial and alluvial formation, can, besides holding much in the depression of their uneven surfaces, take up and retain a varying amount of the water precipitated from the clouds, or coming directly from condensation of atmospheric vapor or otherwise reaching the earth. It may be considered that dry, sandy soil takes up forty-five per cent. of its volume of water;[2] while dried turf can absorb perhaps ten times its weight of water by reason of the great surface created by the enormous number of minute particles. The finely-divided elements of the soil can furthermore, by their capillarity, cause water to rise through their substance to a considerable height, which in loam is many times greater (though the rise is there much slower) than in the coarsest earth (gravel). The hydrostatic power of earth is much augmented by the presence in it of organic matter,[3] and the cleaner the ground is kept the drier it is.

More or less deep in permeable earth, underlain with impermeable strata, water is regularly found completely filling all the pores, and this is called the "ground-water." Not to explain at length the zonal differences of the layer of earth between the surface of the ground and the surface of the ground-water, it may briefly be said that water passes rapidly through this when of coarse gravel, while in very fine soils many months may in our region be required for a given water to make

[1] Read before the American Society of Civil Engineers, Nov. 5, 1890, and before the New York Academy of Medicine, Nov. 7, 1890.

[2] Meister: Soyka, Der Boden, page 83.

[3] Hoffmann: Archiv für Hygiene, ii. 145.

its way from the air down to the surface of the ground-water. By taking up certain constituents and losing others it may have considerably changed its character in the downward passage.

Most varieties of the microörganisms which swarm on and near the surface of the ground are less able to find the conditions favorable to their life and activity after descending a few feet. Some porous soils seem to be permeable to bacteria for less than six feet. Hence the ground-water is often quite free from bacteria. The best deep springs show few or none of these, and the uncontaminated water flowing directly thence is, unless highly impregnated with minerals, the most wholesome of beverages.

These underground bodies of water may be regarded as subterranean lakes or water-courses, usually flowing several feet daily toward the streams or lakes draining the basins in which they are, and the level of the ground-water is lowest near such draining-streams or bodies of water. Hess[1] found that in northern Germany these underground masses of water could move sometimes more than one hundred feet per day. Thiem[2] judged from observations on the Bavarian plateau that from nine to twenty-five feet was an accurate estimate of the daily advance of the ground-water there measured.

It is largely by reason of such enormous and well-protected reserves that the lakes and streams of our region maintain the average level to which they tend to return when temporarily lowered by drought or when swollen by freshets.

For about thirty-five years, since first v. Buhl and Seidel called attention to the principle, v. Pettenkofer and others have insisted upon what they consider the causal relations existing between the moisture-changes indicated by the varying height of the ground-water level, and the prevalence of epidemics, which, they claim, are not much, if at all, influenced by purity of drinking-water as such, by mere filth, or any other than this particular element, which induces the manifestations of activity on the part of the causative germ. Soyka's experiments[3] led him to consider that in a long, dry spell of weather, such as precedes the lowering of the ground-water level, there is a more or less uninterrupted capillary flow toward the surface. With this, living microorganisms that may be in the ground are carried upward into the outer layers of the soil. From the evaporation of this water the microbes remain on the surface or somewhat deeper. With rain they may be washed along or return into the ground. If dry weather persist they may be stirred up with the dust and in their exsiccated state carried far

[1] Zeitschrift des Architekten und Ingenieur-vereins in Hanover, xvi.
[2] Journal für Gasbeleuchtung und Wasserversorgung, 1880.
[3] Prager med. Wochenschrift, 1885.

through the air, as has been rendered evident by repeated examinations where they have been found many miles out above the open ocean. After the evaporation of water coming up to the surface the previously-dissolved substances remain in the upper layers of the ground, and the water there becomes a more concentrated solution of these substances. The ground-water is in itself quite harmless. Its significance is as an indicator of the fluctuation in the moisture of the ground, and the cleaner the earth is kept the less importance is attached to hydrometric changes.[1] While it is not denied that germs may have to be present to cause the disease, this doctrine claims that they can produce disease only when the local conditions favor their activity.[2]

Repeated and careful observations have made those of the Munich school who contend for this "localistic" theory insist that, excepting of course where by artificial drainage we intentionally cause water to be drawn away from the ground, such a disease as, for instance, typhoid fever, increases as the ground-water sinks, and no considerable epidemic of typhoid occurs without at the same time a sinking of the ground-water level. No considerable typhoid epidemic occurs in the period of a large rise of the ground-water, say the champions of the interpretations which v. Pettenkofer has given of the facts as observed at Munich.[3]

The majority of practical hygienists do not endorse these views in their fulness. The definite advances made of late years by biological study have given further and further ground for believing that, among others, such diseases as typhoid and probably cholera are solely caused by the vital activity (within the human organism) of the specific bacteria of these diseases. Inasmuch as a great number of sporadic and epidemic attacks of these scourges have been clearly traced to the consumption of water containing the infective elements of these diseases, and no other factor has there been constant or frequent, this belief is referred to as the "drinking-water theory." While emphasizing the baneful effect of polluted drinking-water, it is of course admitted that unclean ingesta or anything that introduces these living bacteria into the alimentary canal may be the means of carrying the infection into the system.

In the case of cholera the localistic theory seems more difficult to refute than in the case of typhoid. Yet in India, as elsewhere at the time of each epidemic, much circumstantial evidence has accumulated to make us suspect that the presence of the infective element in the alimentary canal is the prime factor in inducing the disease. Bacteriology has

[1] Dr. Max v. Pettenkofer: Deutsche med. Wochenschrift, Nov. 28, 1889, p. 977.

[2] Dr. Max v. Pettenkofer: Archiv für Hygiene, iv. 249; v. 353.

[3] Prof. J. Soyka: Archiv für Hygiene, vi. 257. This is not wholly in consonance with the facts of some epidemics.

strengthened this opinion from the time when Koch[1] found the peculiar spirillum in cholera dejecta and in the intestines of those who had died from cholera. Its presence in the water of a certain tank was demonstrated by him together with the fact that in the neighborhood in question only those who had drunk of this water had the disease. The facts were presented with Koch's unsurpassed precision and carried more conviction than any single one of the various similar histories. Still, no theory suffices to explain the exemption of certain cities (as, *e. g.*, Stuttgart, Salsburg, Innsbruck, Hanover, Versailles, Lyons, and others) from any outbreak during the various epidemics. These important centres of travel and commercial intercourse did not succeed in barring all entrance of infection from without.

Among those who consider that intelligent admission of ignorance is preferable to subserviency to a theory, it is proper here (because of his great and favorable opportunities for many years of observing cholera in its endemic haunts) to mention the statements of Surgeon-General Cunningham.[2] He observed that some districts in India are wholly immune at all times regardless of the contaminated state of the water supplies. In his experience, disinfection of cholera dejecta is useless, and drinking-water does not cause cholera. Unlike some who have never been near India, or have not remained there for many weeks, he considers that railways have not in any way influenced the spread of epidemics of cholera in India either in time, place, or extent. It is needless to say that others dispute the accuracy of these inferences, and there is much evidence on both sides.

Selecting, then, the best portions from these theories, we find that both condemn a drinking-water having many[3] and various bacteria, and both call for abundant supplies of good water for individual and public uses. At the last International Congress, in Vienna, in 1887, where the leading hygienists of the world were gathered—and among them the high priests and acolytes of the ground-water theory—there was a unanimous and unmistakable expression of the opinion that, in order to the maintenance of a high degree of health, cities need an abundant supply of the purest water attainable by them.

The green algæ and the diatomaceæ are found only in waters well supplied with light and air, with no excess of organic matters, and free from regular sources of infection. But the written and oral expression of the opinions of others familiar with the subject, as well as an extensive personal observation, leads me to believe that a water containing a large number of bacteria, especially if many varieties are detectable in it, is undesirable as a beverage so long as it has not undergone the ster-

[1] Bericht über die Thätigkeit der zur Erforschung der Cholera im Jahre 1883, Entsandten Commission, page 182. Berlin, 1887. On page 211 of this report is given an impressive diagram showing the permanently decreased cholera mortality in Calcutta since Nov. 1, 1869, from which time the city has been supplied with hydrant water of much purer quality than the tank and river water previously used.

[2] Cholera: What Can the State Do to Prevent It? By J. M. Cunningham, M.D., etc. Calcutta, 1884.

[3] This is admitted even in Emmerich und Trillich's book, München, 1889, page 168.

ilizing influence of heat. No sufficiently prolonged and repeated clinical observations by medically-qualified workers have yet accumulated to determine just what harm, if any, the ordinary earth- and water-bacteria can produce when extensively consumed by human beings. Most of these microörganisms are classed as harmless.

Unlike pathologists in some other countries, we do not here so often detect the ova of tænia and other intestinal parasites as having come from the ordinary water-supply;[1] and although we here, of course, recognize that some hæmatodes develop first in water, and are thence carried to man, we are not confronted with such unpleasant statistics as Sievers derived from his obductions in Kiel.[2]

From the time when Dr. Michel[3] first called attention to the influence of contaminated water in causing typhoid fever (1855), and Snow in 1848 said that cholera was due to the use of infected water, an enormous mass of evidence has been constantly accumulating and has caused nearly all physicians among us to believe that such influence has usually been operative in those cases they have met with, even if for various reasons the exact source of the infection could not be traced. Furthermore, numerous attacks of diarrhœal disorders have been explainable in no other way.

Endorsing Naegele, the botanist, and other partisans of the extreme ground-water theory, Emmerich[4] performed a series of experiments upon animals, and, therefrom, inferred that decomposing organic matter taken with water into the stomach could not cause harmful symptoms. As evidence of his sincerity, he daily, for two weeks, drank from one to two pints of very foul water taken from a hospital brook, which to the naked eye and to chemical tests was distinctly infected with sewage, and which showed a large amount of chlorides, ammonia, and various organic substances. During the first three days he noticed slight gastritis, yet during the remainder of the fortnight no ill-effects were recognized. A month later, having acquired a gastro-enteritis, he again tested upon himself in the same way the effect of the same sort of water, but observed no detriment to his health.

Very few could be induced to repeat such unpleasant subjective experiments, and many such would only prove that polluted waters vary in character and are not at all times, and under all circumstances, demonstrably harmful. Most persons would, if solely for æsthetic reasons, strongly object to drinking freshly-polluted waters.

The experiments of Prof. J. v. Fodor[5] show that, unless sterilized, as by boiling, foul waters may be assumed to be dangerous, even if not obviously so; for they tend to cause some degree of putrid infection, which, however vague, may like extreme hunger[6] and other "cachexies," act to weaken the system and render it less resistant to general or special infection. Beside abundant laboratory evidence of this sort, the most

[1] Knoch: Virchow's Archiv, xxiv, 453.

[2] Sievers: Schmarotzerstatistik, Kiel, 1887.

[3] See Annales d'Hygiène Publique, etc., Dec. 1889, page 541.

[4] Zeitschrift für Biologie, xiv. 563.

[5] Archiv für Hygiene, iii. 118.

[6] Canalis und B. Morpurgo, Fortschritte der Medicin. Sept. 15, and Oct. 1, 1890.

impressive of tests have unintentionally (but in general with apparently very serious results) been made by so many bodies of men and communities, that the mere enumeration would cover many pages. When more than one-tenth of a population are attacked by typhoid after drinking of the water from a presumably pure mountain stream, stored for consumption, but into which a small amount of typhoid dejecta had been introduced (to cite the familiar experience of Plymouth five years ago), the fact that the majority of those using the same water, perhaps uncooked, revealed no symptoms of the malady, does not invalidate our right to interpret these epidemics by the light of our present knowledge, and so infer that a polluted drinking-water may be very dangerous. If Vienna, paralleling London's well-known experiences with cholera and typhoid, averaged many times the number of deaths from typhoid when she supplied her people with the water of the swift, "blonde" Danube, than she has had since the hill-spring supply has been furnished, the fact is very significant. But here, too, v. Pettenkofer has come forward with his keen interpretation of the facts, and has tried to show that infected water had nothing to do with the causation of the disease.

There are a few authentic laboratory experiments[1] which go to show that, in ordinary water, disease-producing bacteria are at least in some cases more or less speedily destroyed by the hardier saprophytic varieties that abound in all supplies of doubtful quality. But since first Moers[2] found the bacillus of typhoid in water suspected of having caused the disease, the finding receiving Prof. Gaertner's confirmation when it was later questioned; and Michael[3] likewise detected these under similar circumstances, and was endorsed by Prof. Johne, a considerable number of competent bacteriologists have in different countries reported similar results. Others have verified these facts by adequate laboratory trials. So we are to-day allowed to believe that the microörganisms which cause various diseases can, despite the antagonistic influence of ordinary bacteria and under conditions which we as yet do not clearly understand, live at times for at least several days in natural and artificial waters of varying degrees of purity and still retain enough of their specific vitality to induce more or less serious cases of disease. The terrestrial and other conditions influencing the activity of these presumable causes have not yet been established with sufficient accuracy.

[1] Arnould: Revue d'Hygiène, ix. 27. Freudenreich: Annales de l'Institut Pasteur, iii. 200. De Giaxa: Zeitschrift für Hygiene, vi. 102; Annales de Micrographie, 1890. Garré: Correspondenzblatt der Schweizer Aerzte, 1887. Karliński: Archiv für Hygiene, 1889, 113, 432; also 1890, page 464. Kraus: Archiv für Hygiene, 1887, 205. Zagari: Giornale Internazionale delle Scienze Mediche, ix.

[2] Ergänzungshefte zum Centralblatt für allgemeine Gesundheitspflege, ii. 2, 144 (in 1886).

[3] Fortschritte der Medicin, iv. ii. 353 (in 1886).

Chemistry affords us no sufficient test of the freedom of a water from the infective principles which cause serious diseases or which lessen the sum-total of the vital forces and increase the susceptibility to infection. Yet, in lack of sufficient biological study of the question of self-purification of polluted sources of water-supply, the extensive and valuable reports of chemical examinations of numerous streams are very interesting and instructive.

Quite contradictory in their conclusions to almost all others, the eminent investigators engaged on the work done by the famous English Commission in the years following 1868, concluded that no river, even in a course of more than a hundred miles, became purified after pollution by organic matter. In all other countries the opinions are, and have generally been, that after flowing a number of miles from the place where sewage had entered, the river has chemically purified itself of at least a portion of the organic matters introduced. Thus the chemists connected with the investigation of the Seine waters found[1] that this river, after becoming very foul from receiving the sewage of Paris, purified itself in a flow of from one hundred and nine to one hundred and fifty kilometres, so that it had returned to the same chemical quality that it had before reaching Paris. Of the numerous German presentations of similar facts that of Hulwa[2] is, like the repeated examination of the Isar at and below Munich, still more convincing. Hulwa found that the Oder after receiving the sewage of Breslau had completely purified itself chemically in a flow of thirty-two kilometres (or less than twenty miles). In this country the determinations of the late Prof. Wm. R. Nichols[3] made him conclude that various rivers of Massachusetts went through a similar process. Very interesting in this regard are Long's[4] results, as he tested the changes in dilute sewage flowing from Chicago for miles down a canal. The element of considerable constant or irregular dilution is thus omitted till the Illinois River is reached. The oxidizing process causes the water to become much purer at Ottawa, after eighty miles of flow, and it is still purer at Peoria, one hundred and fifty miles from Chicago. The most notable improvement was with respect to free ammonia, and the process was decidedly more active in summer than in winter.

Stagnant water and that standing in vessels require much longer time than moving water to have a certain degree of reduction take place in the organic substances present. Most chemists have been led to attribute a very great influence in this respect to the numerous bacteria which are

[1] Vierteljahrschrift für öff. Gesundheitspflege, ix. 434. Durand-Claye: Assainissement de la Seine, Paris, 1885.

[2] Ergänzungshefte zum Centralblatt für allg. Gesundheitspflege, i. 68.

[3] Mass. State Board of Health Report, 1875.

[4] American Chemical Journal, x. 26. London Chemical News, June 29, 1888.

found to be present in all sewage-contaminated waters. That the "nitrifying" varieties of these accomplish the work of oxygenation was first declared by A. Müller.[1] Emich[2] supported this theory by experiments in which he found that water purified itself chemically if many bacteria were present, but the same water sterilized by heating and kept germ-free did not improve chemically until, from exposure to the air, other bacteria had entered. Direct oxidization by the oxygen of the air did not take place, and the action of ozone and peroxide of hydrogen was less potent than that induced by bacterial activity. Heræus[3] studied the question and found that bacteria differed greatly in their activity in this direction. He got no oxidation with any of the few river and earth varieties that he tested. In Europe and at Lawrence, Mass., recent tests have shown the importance of these theories.

Biological investigations into the self-purification of rivers have been very scanty and incomplete. Frank,[4] Prausnitz,[5] and Uffelmann,[6] examining, respectively, the Spree, the Isar, and the Nebel, found that the number of bacteria present before the accession of the city sewage had increased with the addition of this polluting fluid. Within a dozen miles or so of the place of the sewage introduction, the water, even if biologically inferior, seemed usually not much worse than might have been the case if no city filth had contaminated the river. Schlatter[7] has recently reported that the Limmat usually purified itself bacteriologically to a marked degree within nine miles after receiving the sewage of Zürich.

These and similarly executed observations are very important, even though the present methods of examination have not reached the degree of perfection (aimed at by Chantemesse, Holz, and others) that shall enable us to cultivate the morbific germs present in a given example, by means of some perfect medium that at the same time suppresses any or all others, as we may elect. The commoner bacteria are in general hardier than the noxious ones, and, as in the laboratory, so in nature tend as a rule to destroy the harmful ones—or at any rate prevent their increase. Both kinds are exceedingly alike in many respects, and certain varieties of the harmless ones are very difficult for an expert to differentiate from well-known disease-producing varieties. Considering, therefore, the present status of practical bacteriology and its limitations, it seems a very fair test of the question whether rivers purify themselves from infection introduced, if we compare the numbers of germs found present

[1] König, Berlin, 1887, page 99.
[2] Monatshefte für Chemie, vi. 77–94. Chemisches Centralblatt, 1885, 333.
[3] Zeitschrift für Hygiene, i. 193, 213.
[4] Zeitschrift für Hygiene, iii. 355.
[5] München, 1890.
[6] Vierteljahrschrift für öff. Gesundheitsflege, xxii. 377.
[7] Zeitschrift für Hygiene, ix. i. 56

in the water taken at different points. We can then reason from the figures and facts thus afforded. Hence, I herewith present data from some of the analyses which I have at various times been able to make. All have been done according to Koch's gelatine method, and, what is most important, all the waters have (unless the contrary is mentioned) each been plated within a few minutes after taking the sample in the most careful manner from the body of water. This has been effected by means of a portable "cool chest," which allows the method to be successfully employed even amid the high heat of the "Great American Desert" in summer.

A swift, foaming mountain brook, that of the Kaaterskill "Clove," was tested at a part where it might have recently received the drainage of several hundred people, and where dilution seemed less conspicuously an obstacle to accuracy than would be expected in many parts of the brook's course. The ground was wet with rain which had fallen within twenty-four hours. Hence the element of dilution and possibly the entrance of new (surface) bacteria make the figures lack absolute value:

| 1890, September 11: | Bacteria in 1 c.c. |
|---|---|
| Brook in Catskills (after chance of pollution) | 54 |
| Same brook 1½ miles further on (after 300 feet of irregular fall) | 49 |

Cœur d'Alène Lake supplies the Spokane River, which is tributary to the Columbia River. Pend d'Oreille Lake is in similar wild country and its effluent stream enters the Columbia River in British America. The former lake I did not test, owing to the greater difficulty and delay involved in getting out from it—an element which might imperil the accuracy of the results. It probably has fewer bacteria than the lake given, and which answers here our purpose. The water was plated within five minutes of obtaining the sample fifty feet out in the lake, at a time shortly after a rainfall, and in a portion near a small lumber camp:

| 1890, June 10 (clear): | Bacteria in 1 c.c. |
|---|---|
| River flowing into Pend d'Oreille Lake (rain on previous day) | 154 |
| Pend d'Oreille Lake, highest number found[1] | 43 |
| Spokane River, 4 miles above Spokane Falls | 69 |
| " " just below city and falls (Spokane) | 129 |
| " " one mile further down | 125 |
| Willamette River, 4 miles above Portland, Oregon | 44 |
| Columbia River, 37 miles below Portland, and 31 miles below confluence with Willamette River | 52 |

The Mississippi affords in places excellent chances to study the question. The changes which are undergone by the pectose and other de-

[1] This number was above that of the average of Western lakes. Thus Union Lake, upon which Seattle verges, averaged in the middle of its surface (June, 1890) only 13 germs per c.c. on three plates which I made of its waters.

composable elements of the vast quantities of logs and wood-refuse that the lumber industries cause to be present here do not seem to cause nearly so great an increase in the number of bacteria present as though the organic matter were wholly in the form of that coming from the surface-drainage of agricultural districts and many habitations. This I have observed in the Ottawa River of Canada, and in other parts of the North.

Above the St. Anthony Falls the Mississippi has already drained a fairly populous portion of its valley. After passing over the falls the water receives sewage, then falls rapidly for a short distance, and in the next ten miles does not appear to receive much other contamination. The time when the water was taken seemed very favorable for excluding any unusual degree of this, yet in view of the figures I am inclined to suspect some contamination not detected; but the fact that the sample from St. Paul stood unplated for an hour may explain the number found. Even a passenger-boat crossing up stream may at times cause a decided increase in the number of bacteria in some parts of the current. This I know to my cost, from having in that manner had a series of plates made at Sault Ste. Marie rendered unreliable for the purposes of this paper.

| 1890, June 8 (clear and sunny): | Bacteria in 1 c.c. |
|---|---|
| Mississippi River, above Minneapolis | 620 |
| " " just below Minneapolis | 794 |
| " " above St. Paul, 10 miles below former sample; no obvious source of pollution | 843 |

(Last sample kept one hour before plating.)

But for its short flow, the Passaic River furnishes every feature that could be desired for the study of this question. The northernmost tributaries furnish pure water in most parts. Between the junction of the Pequannock and the Great Falls at Paterson (six or seven miles) its way is through a rocky valley receiving relatively little drainage. In that distance, and with the Great Falls, the descent is 100 feet. Before the partial obliteration of the Little Falls, recently accomplished for economic agricultural reasons, I endeavored there to determine the influence of the violent agitation upon the number of microörganisms in the stream before and after such action:

| 1889, February 13 (sunny and cold): | Bacteria in 1 c.c. |
|---|---|
| Lake Macopin, highest number found | 57 |
| Pequannock River (below a hamlet) | 361 |
| Passaic River, above Great Falls at Paterson (after draining 855 square miles) | 573 |
| " " below Great Falls in Paterson (near a mill) | 1030 ± |
| " " " railway bridge (after receiving sewage) | 2172 |
| Water from Newark hydrant (supplied from lower Passaic River) | 4000 ± |

| 1889, November 5 (cloudy and cool): | Bacteria in 1 c.c. |
|---|---|
| Passaic River, half mile above Little Falls | 372 |
| " " ten feet from rocky bank, just above falls | 720 |
| " " " " " " below " | 704 |
| " " middle of Lincoln's bridge (five miles down stream) | 631 |
| " " just above Great Falls | 600 ± |
| " " " below " " | 600 ± |
| " " Middle of railway bridge (after mingling of sewage) | 1934 |
| " " " " " " above Passaic | 1907 |

± Denotes partial liquefaction of plates such as to prevent absolutely precise determination.

After leaving the region of Port Jervis the Delaware gradually enlarges, but regularly receives comparatively little objectionable drainage till Easton is reached at the junction of the Lehigh. Here it has mingled with it the more or less recent and diluted refuse of probably more than one hundred thousand people. All the way down to Trenton over fifty miles further, the drainage is considerable and comes from a large area having many farms and numerous inhabitants. Thirty miles beyond Trenton, Philadelphia takes part of its water from this river after it has flowed from a water-shed supporting over half-a-million people.[1] My examination was made at a time when considerable rain had fallen in this valley during the previous three days, and the biological results must be numerically regarded as those of the river when at its worst. Various kinds of microörganisms were detected in the water, including numerous "earth" and putrefactive bacteria. Among these were "Proteus" forms which may be ranked among the objectionable varieties,[2] yet they are probably antagonistic to the germs of typhoid.[3]

The Trenton water, said to be from the hydrant, taken by me on the same day at the Pennsylvania Railway Station, had only a few hundred bacteria of five distinct harmless varieties. It was quite unlike the river-water in character.

| 1889, April 27 (rainy, river swollen): | Bacteria in 1 c.c. |
|---|---|
| The usually excellent lake above Delaware Water Gap | 1,230 |
| Delaware River at Water Gap | 3,400 |
| " " above Easton | 4,270 |
| Lehigh " " " | 4,925 |
| " and Delaware mingled four miles below Easton | 10,000 ± |
| Delaware River at bridge near Trenton water intake | 20,340 |
| Collected by Philadelphia health officer, and carefully kept cool till plated by me after four hours or more: | |
| Delaware River, Philadelphia pumping station | 28,000 ± |
| Schuylkill at Roxborough | 43,750 ± |
| " at Spring Garden | 44,456 ± |

[1] See Report of Engineers Hering and Ludlow, Phila. Water Department, 1885.

[2] Hauser: Ueber Fäulnissbakterien, Leipzig, 1885. Bordoni-Uffreduzzi: Zeitschrift für Hygiene, iii. 333.

[3] Karlinski: Archiv für Hygiene, 1890, 473.

Under these unfavorable conditions, rivers, even in a sparsely-settled region where there is little or no farming, may be expected to show an increase in the number of bacteria as the samples are taken further and further down the stream. This I have observed in several of the rivers of this State and elsewhere in the East as well as in the Yellowstone Valley this summer on the occasion of a rainfall. Then the river at Glendive had more living germs in each cubic centimetre than were found at Billings, which is over two hundred and fifty miles further up toward the National Park.

The causes of the large proportion of cases of typhoid in Philadelphia cannot be traced to any single source of infection. The water-supply—if indeed here the chief cause—may have received the dangerous germs at any place between the *pumping-stations* (in sewage-polluted tidal waters) and more or less remote tributaries. It is very difficult to prove that contagion can be carried many miles down a river and many deny the possibility of this occurring. Owing to the use of contaminated milk by a number of families in Port Jervis, on the upper Delaware, a town of less than ten thousand inhabitants, the place had a slight epidemic of typhoid fever from October 1, 1883, till the end of the year. No increase in the number of deaths from that disease in Philadelphia was recorded until January, 1884, when the total amounted to almost double the average for the same month during the preceding five years. From these facts one should not infer that the increase of the disease in Philadelphia was caused by the bacteria which had survived the hundred-mile passage down the river, especially as in Trenton (which also takes water from the Delaware) there was, as I learn through the kindness of Dr. Ezra M. Hunt, no increase of this disease noted at the time. Still it seems highly probable that the health of the city would be improved if all its water used for domestic purposes came from a remote location on this fine river and were then conducted for many miles through an aqueduct. The deeper such aqueduct and its reservoir the cooler would the water be in summer; and the more moderately cool pure water is, the more wholesome it is for the masses of a city's population.

From the above-given observations it can be inferred that, under the most favorable conditions, river water tends to a certain degree to purify itself of infective and other bacteria introduced. So long as fresh contaminations are constantly entering, this purificative tendency is virtually inoperative. The liability to error, owing to unrecognized (not easily appreciable) contamination of the waters, lessens the value of any tests made with our rivers. Hence, for the purpose of definitively resolving a portion at least of the problem, I have had recourse to a series of biological analyses of the Croton water in different parts of its flow through the magnificent aqueduct which for nearly half a century has so well served this city.[1] By reason of its superficial passage and of the configuration of the country, the old Croton aqueduct follows a more devious course than the new one, which is not yet in complete working order. Therefore, and because of the thorough aërification, the old aqueduct (although dark throughout) is (for our purpose) much like an

[1] I wish to indicate my appreciation of the courtesy of the Chief Engineer and his assistants.

ideal stream, and is admirably adapted for testing the question at issue. The samples were collected at such intervals as corresponded with the flow of the current, which averaged a rate of a little more than two and a half miles an hour. Plates were prepared from the water as soon as it had been taken out by means of the usual sterilized bottles.

| Water of Old Croton Aqueduct. | Miles from Central Park. | Bacteria per cubic centimetre. | | | | |
|---|---|---|---|---|---|---|
| | | Dec 25, 1889, clear. | Feb. 27, 1890, clear. | April 3, 1890, drizzly. | Sep. 30, 1890, clear. | Oct. 11, 1890, some hours after rain. |
| Temperature of water. | | 39° F. | 37° F. | 40° F. | 60° F. | 58° F. |
| Sleepy Hollow, Tarrytown | 27 | ... | ... | 420 | 372 | |
| Dobb's Ferry | 22 | ... | 453 | | | |
| Yonkers | 17 | ... | 283 | | | |
| Van Cortlandt | 12 | ... | 292 | ... | 207 | 405 |
| Broux inflow, adding $\frac{1}{12}$ or less to volume of stream | ... | ... | [227] | | | |
| High Bridge | 6 | 347 | 266 | 413 | 240 | 377 |
| Central Park inlet to reservoir | 0 | 285 | 175 | 407 | 199 | 302 |
| West side, hydrant | ... | 229 | 137 | 394 | 215 | 248 |
| New aqueduct (slight temporary flow) | ... | ... | ... | ... | 183 | |
| Surface of reservoir | ... | ... | ... | ... | 72 | 143 |
| 1 foot from bottom of reservoir [35 ft. deep] | ... | ... | ... | ... | 487 ± | [1] |
| 3½ feet " " " " | ... | ... | ... | ... | 368 ± | [1] |

These results must be interpreted as indicating that, under the best sanitary conditions, the number of germs of bacteria present in a flowing water usually tends to become less after a course of a few miles, provided that no new ones introduced have taken the place of those that have lost their vitality. So, the question arises, How is this decrease produced? As factors possibly acting to bring about this result we may consider—dilution, sedimentation (subsidence), concussion, chemical influences (including oxidation), light, heat, or cold, and the previously mentioned and admitted antagonistic action of other microörganisms.

Dilution of the water in which they are living does not kill bacteria; and the fewer existing in a given water the longer can any harmful ones present probably resist the antagonistic activity of the others. Dilution by a better water lessens, of course, the number previously existing in a given volume. Inasmuch as the little that is known on the subject leads us to infer that, of disease-producing kinds, a considerable number of individual bacteria must reach the vulnerable part of the invaded animal organism before they affect the health if they do so at all, we may believe that a lessening of the number of harmful bacteria by means of dilution renders water less unfit for drinking, yet does not make it absolutely wholesome, even though causing it to appear rela-

[1] Hydrophore worked defectively.

tively so. In the Niagara River, for instance, this element is very important. Although there I have several times been thwarted by rains and by other causes when starting out to analyze the waters, I have, through the kindness of Dr. Bergtold, received a series of samples which showed that the sewage-water of Buffalo became biologically as well as chemically much purer at Tonawanda, eleven miles lower down toward the cataract. There, as in most rivers, the purification is in great part effected by dilution. In the river water above the falls I found very many hundred bacteria after a rainfall, which there, as in other places can, by surface-washing bring noxious elements to a water.[1]

From various experiments[2] it is known that particles settling in water carry down a notable proportion of the bacteria present. The chemical agents which are at times employed, by uniting with the organic matter present, effect much more than the merely mechanically-acting, weighty particles. Like several other investigators, I have at times during the last two years endeavored to determine whether in vessels of clear water from ten to twenty inches deep (also twice in tanks ten feet deep) bacteria settled to the bottom. The results have been neither uniform nor decisive, yet they seemed to manifest in general a slight tendency to subsidence. In laboratory tests the problem is rendered complex by the jarring of the building, the amount of air and light present, the variations of temperature, and other artificial influences unlike those operative in large bodies of water. The few observations made to test lakes, as by Fol and Dunant at Geneva Lake, Cramer at Zurich Lake, and Prausnitz at Starnberger Lake, do not indicate any great degree of subsidence. Of large bodies of water I have found:

| 1890, August 28: | Bacteria in 1 c c. |
|---|---|
| Saratoga Lake, central part, surface | 56 |
| " " " " 13 feet down | 54 |
| " " 1 foot above bottom, 32 feet deep | 163 |

The few tests here given of the water in the Central Park reservoir permit the inference that there is some subsidence of bacteria there. Not to consider the larger number found at the bottom (as in only one instance did the apparatus work perfectly), there were fewer on the surface of the middle of this large body of water than entered through the aqueduct.

Very interesting in this regard are the results attained by G. Frank,[3] who found that the hundreds of thousands of bacteria regularly detected

[1] Fluegge (Hygiene, 1889, 193) states that *bacillus Typhoid.* has been isolated from earth of a field with which typhoid dejecta had "not long before" been mixed. We know that this bacillus can, under certain circumstances, live for many weeks in dejecta.

[2] Kruger: Zeitschrift für Hygiene, vii. 109.

[3] Zeitschrift für Hygiene, iii. 355.

in the Spree River water after it had received the sewage of Berlin, continued undiminished till after this foul water had passed into the Havel —a river that then for some miles flowed sluggishly through a series of broad expansions. After a course there of not much over eight miles, it was usually found that the water taken lower down (from Sacrow) had only a few thousand germs. As this diminution was, for chemical reasons, not to be explained by assuming an inflow of ground-water, it could be attributed to nothing but a subsidence of the microörganisms in the lake-like widenings of the slow river, perhaps influenced by the abundant organic particles present. The government health office,[1] testing similarly the city sewage poured over a large area at the experimental station, found a marked diminution of the bacteria present. There many settled in the still water before it flowed over into the Rummelsburg Lake.

Concussion and movement of the water I have not found to cause any considerable and immediate lessening of the number of bacteria, even in waterfalls[2] or where powerful pumps force it under great pressure. That harmful bacteria present can, notwithstanding vigorous concussion, produce fatal infection is obvious from the causation of an outbreak of Asiatic cholera at Southampton, in 1866, resulting in 107 deaths. It was traced by Parkes to the dispersion of infected sewage through the air by the unusual method of the bursting of many bubbles after the fluid had been churned up by powerful pumping and in a frothy condition driven along an open channel.[3]

That sunlight, as also diffused light, exercises an inhibitory influence upon the vitality of microörganisms has been a somewhat prevalent belief since the first report of Downes and Blunt,[4] which incited Tyndall[5] and various following investigators. Raum[6] gives a list of many of these. A few, like Engelmann,[7] state their views that this influence does not arrest microbial growth and movement. The majority, like Janowski,[8] consider that light, even in a diffused form, restricts the development and activity of bacteria. In deep water this factor is of little or no consequence.

The even temperatures maintained in great bodies of water during the warmer portions of the year are favorable to bacterial life. The combination of moisture and great warmth, as in the delta of the Ganges,

[1] Jurisch, Berlin, 1890, page 79.

[2] Schmelck (Centralbl. f. Bakt. und Paras., July, 1890, page 102), testing Scandinavian waters, found many bacteria in the ice formed from the spray of a waterfall. Here oxygenation, cold, light, and the effects of concussion had all been operative.

[3] Frankland: Proceedings of the Royal Society of London, xxv. 542.

[4] Ibid. xxvi.

[5] Ibid. xxviii.

[6] Zeitschrift für Hygiene, vi. 313.

[7] Pflüger's Archiv, Bd. xlii.

[8] Centralblatt für Bakteriologie und Parasitenkunde, August 1, 1890.

is considered a potent factor in maintaining the germs of cholera so constantly vigorous that there the disease is always endemic. Cold does not destroy all bacteria, although a certain number succumb to extreme cold. Congelation of the water in which they are living seems relatively favorable to a portion of the pernicious microbes present.[1] In many serious epidemics it has been observed that in ice and snow the infection of typhoid was kept active for months.

Some chemical waste from manufacturing establishments has a destructive effect upon these low organisms; but such vague and irregular means can itself only be called a pollution of the streams, and is highly undesirable. The typhoid epidemic of 1889 at Wilkesbarre, Pa., caused it to appear that the bacilli of that disease were probably unaffected by the commingling of coal-mine water (containing free sulphuric acid and ferric sulphate) with the Susquehanna River water before this was taken by the water-works of the city.[2] When intelligently employed in suitable proportions, chemicals render foul water much purer. As a conspicuous instance of this I need only mention the city arrangements at Wiesbaden, by which the sewage is treated with quick-lime. It thus becomes odorless fertilizer and clear water flowing toward the Rhine. Dr. A. Pfeiffer,[3] unlike Fränkel and others, asserts that, even after this thorough treatment of the sewage, from one-fourth to one-third of the bacterial germs remain alive in the water! If this be so, no acids or bases present in ordinary water are of any disinfectant value. Certainly the small amount of carbonic acid found in streams can devitalize no bacteria. Hochstetter[4] and Fränkel[5] found that by the action of this agent only a few varieties were markedly affected, and that nearly all the harmful ones could live in carbonated waters for days. My own observations have been to the same effect.[6]

The presence of a small quantity of mineral salts, as in the various mineral waters, has no notable influence upon the number of bacteria present. In all kinds of bottled waters from all parts of the globe living bacteria may be found, unless these waters have passed through a sterilizing process. Of the numerous waters flowing from the well-known springs in the Saratoga Valley, I have found that some were wholly sterile, while neighboring ones of like saline ingredients had hundreds of living bacteria in each cubic centimetre, the determinations being made immediately after the water to be tested had issued from the ground.

[1] Prudden: Med. Record, March 26, 1887. Bordoni-Uffreduzzi: Centralbl. f. Bakt., 1887. Fränkel: Zeitschr. f. Hygiene, i. 2, 302.

[2] Breneman: Journ. of the Amer. Chem. Society, xii. No. 1.

[3] Deutsche Vierteljahrschrift fur öffentliche Gesundheitspflege, xx. 55.

[4] Arbeiten aus dem königlichen Gesundheitsamte, Band ii.

[5] Zeitschrift für Hygiene, v. 333. [6] New York Medical Record, xxvii. 680.

Oxygen is everywhere present in the atmosphere in such abundance that, even in city streets, its proportion does not fluctuate more than ½ of 1 per cent. from the normal 78.3 per cent. contained in the purest air. Of this atmospheric air, somewhat less than 2 per cent. of the volume of a mass of water is taken by the water. This fact is the foundation for a satisfactory explanation of a great part of the actual lessening of the number of bacteria in a flowing stream. They may be assumed to perish in the active exercise of their function of causing the organic matters to oxidize. When this impurity is in the form of the organic matter occurring in sewage, the process of reduction is a much more active one than with the *humin* substances found more prominent in purer river waters. It can hardly be claimed that ozone is ever present in these waters in sufficient quantity[1] to act as a disinfectant. The same may be said of peroxide of hydrogen, which, in the laboratory, as we may believe from the experiments of Altehöfer[2] and others, destroys B. typhoid. and all other bacteria exposed for twenty-four hours to a 1 : 1000 solution of this in water.

SUMMARY.—While our knowledge of the etiology and intimate processes of disease is at best very limited, and while telluric and other conditions exercise, upon our states of health and disease, influences not as yet comprehended, recent progress in biological science has caused much light to be shed upon some of the causes of various infectious disorders. In view of bacteriological explanations we cannot doubt the potency of polluted water in causing the diffusion of some diseases and notably of typhoid fever. Like other harmful germs the characteristic bacilli of this disease can live for days in water whose gross appearance is that of purity, although the other microörganisms, such as are nearly always to be found in natural waters, tend to destroy the pernicious varieties.

There exists in all streams a capacity for self-purification. Biologically, this is manifested by a lessening of the number of bacteria present after several miles of flow, in case no fresh accession of inferior water occur. The pernicious varieties probably lose their harmful character or when not excessively abundant are so diffused throughout as to be virtually harmless. Dilution seems the main factor in inducing this improvement, but oxidizing processes are of considerable importance in purifying waters. In rivers with very slow current or in lakes, probably some bacteria settle. They unquestionably do so when the state of the water is such as to induce sedimentation. The application of this

[1] Kowalkowsky: Zeitschrift für Hygiene, ix. 1, page 89.

[2] Altehöfer: Centralblatt für Bakteriologie und Parasitenkunde, July 25, 1890, p. 136. Van Hettinga Tromp: Wasserstoffsuperoxide ter Desinfectie van Drinkwater, 1887. Uffelmann: Jahresbericht, 1888, 47.

principle has produced beneficial results in the water-systems of certain cities. "Antagonisms" among bacteria shorten the life of disease-producing germs in waters where other (presumably harmless) kinds abound.

The excellent water supplied to New York is somewhat improved by the long flow through its superb aqueduct; yet too great care cannot be taken to keep the Croton watershed as free as possible from all habitations and industries. Only by vigilant and intelligent efforts can lasting and constant purity of the supply be maintained. Especially on summer days and during the time of high dry winds would it be advisable to moisten more assiduously the dusty and much-frequented walks and roads about the Central Park Reservoir, as the deposit of much undesirable dust and accompanying bacteria in the water (shortly before its distribution throughout the city) could thereby be prevented.[1]

It is more economical and much safer to prevent contamination than it is to use filters when the water has become dangerous. Large filters, when very carefully managed, effect a great improvement in inferior waters;[2] but they do not prevent all disease-germs from passing through.[3]

It would be a most prudential act for the State to restrict the present devastation of its fine woodlands, and we should encourage the planting of at least one tree for every one hewn down. Forests afford a very valuable means of water-storage at the fountain-heads of our streams and aid greatly to preserve the desired constancy of flow.

Inasmuch as impure water probably causes disease oftener than we can demonstrate, and as there is unfortunately an immense body of irrefutable proof of its frequent harmfulness, all suspected water—and this especially at time of an epidemic—should, like all other foods, be cooked. Concerning such liquid foods as water and milk it may be said that a very brief boiling, as I have elsewhere indicated,[4] makes them free from the infective property which they in an uncooked state might possess.

[1] Unclean dust can be carried very far; but, although the subjects are closely related, I will here merely intimate that the excessive filth of our streets will be sufficiently remedied only when our greater and lesser public servants are made to realize the importance of cleanliness in every sense of the ill-understood word. Unclean streets and dwellings among the poor can cause disease among the opulent. The filthiness of individuals can endanger the health of the many.

[2] Currier: Medical News, April 27, 1889.

[3] Fränkel: Deutsche medicinische Wochenschrift, December 12, 1889, pages 1023, 1025.

[4] New York Medical Record, June 14, 1890. New York Medical Journal, June 21, 1890.

# REVIEWS.

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MEDICAL DIAGNOSIS WITH SPECIAL REFERENCE TO PRACTICAL MEDICINE. A GUIDE TO THE KNOWLEDGE AND DISCRIMINATION OF DISEASES. By J. M. DA COSTA, M.D., LL.D., Professor of Practice of Medicine and of Clinical Medicine at the Jefferson Medical College, Philadelphia; Physician to the Pennsylvania Hospital; Consulting Physician to the Children's Hospital, etc. Illustrated with engravings on wood. Seventh edition, revised. Philadelphia: J. B. Lippincott Company, 1890.

IF the custom of prefacing a book with a motto were universal, none better could be found for this than *experto crede*, for it contains the condensed experience of one of the greatest living diagnosticians. A diagnosis may undoubtedly be made in the laboratory from the study of sputum, blood, or urine, but it will be always a partial and frequently a negative one. For example, the knowledge that sputum is or is not tubercular may be of great value, but in either case it is not so much the disease as the patient that is to be treated, and to this end the diagnosis must be, in the fullest sense of the word, *physical*. It is the constant recognition of this fact that has made this book the foremost of its kind and has led to its translation into the principal European languages.

The fact that one of the busiest of practitioners, a hospital physician, and a teacher, should be able to produce such a book, is surprising to those who are not unaccustomed to work and have ample time to devote to it. The ability to keep abreast with the rapid march of progress in every department of medical science can only be explained by the statement which is, after all, a mere truism, that the acquisition of knowledge, like that of other property, is easiest to him who has most.

It is unnecessary to enter into any detailed notice of a book which has gone through so many editions. Its most prominent feature, if one can speak of prominence in connection with symmetry, is that each chapter is so thorough that the specialist in any department of medicine may obtain valuable assistance in the diagnosis of obscure cases.

It is interesting to trace the progress of diagnosis in the successive editions and especially in connection with those subjects of which our general knowledge has advanced the most. Those are doubtless the diseases of the nervous system, of the digestive system, and of the blood, and the author is to be congratulated on his success in gleaning the best in each of these fields and in winnowing out an enormous amount of chaff.

The reviewer, in common with all who open this book, becomes interested in its lucid descriptions of the phenomena of disease, their con-

trasts and resemblances, recalls almost forgotten cases which had perplexed or baffled him, turns over the leaves with the object of finding some information concerning them, and is invariably successful. Such a case was reported by the writer in 1881,[1] under the title of "Asynchronous Contraction of the Cardiac Ventricles, with Remarks upon Reduplication of Heart-sounds," a similar one having been reported by Leyden in 1868. On page 403, DaCosta says: "A peculiar kind of irregular action of the heart has been much discussed under the name of *hemisystole*. Leyden pointed out that there were cases in which with every two beats of the heart only one beat of the pulse was felt, and attributed this to the right ventricle alone contracting alternately with the left. Different explanations of the fact have been given by different authors, but the observations of Riegel and Lachmann, while they do not strictly confirm the alternate action of the ventricles as the cause of the phenomenon point to irregular contraction of the muscles of the heart as the cause."

This, although interesting, is somewhat inconclusive, and the question seems to be one in which the *a priori* improbability of asynchronous ventricular contraction is allowed too much weight. The possibility of independent contraction of the ventricles has been demonstrated by Prof. W. Gilman Thompson, of New York, in his valuable paper on the "Movements of the Heart," in the *Reference Handbook of the Medical Sciences*, vol. iii. p. 571. He paralyzed the right ventricle of a pigeon's heart by injection of aconite, and then stimulated the left ventricle to contract by glonoin, one per cent., applied externally. An instantaneous photograph, taken during the application, showed the right ventricle to lie "like a loose cover on top of the firmly-contracted left ventricle." While this does not actually demonstrate alternate ventricular contraction, it would, we think, show its possibility even in the absence of the clinical facts which, in our opinion, indicate it.

This case has been alluded to chiefly with the object of showing the confidence with which one may turn to this work for enlightenment upon the anomalies of clinical experience and is but one of many examples of the sort.

The book is typographically almost perfect, the only error of the sort being so glaring as to explain itself. We refer to the statement that the number of white blood-corpuscles is to the red as one to fifty, it being scarcely necessary to say that the printer has omitted a cipher in the last number. F. P. H.

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FAMILIAR FORMS OF NERVOUS DISEASE. By M. ALLEN STARR, M.D., PH.D., etc. New York: W. Wood & Co., 1890.

DR. STARR has written, as was to be expected, a very readable and useful book. The title is unfortunate, for it cannot be said that some of the diseases most fully described in this work, involving as they do some of the most complex questions of cerebral and spinal localization, are familiar; especially to the "general practitioner," for whom the

[1] Archives of Medicine, August, 1881.

book appears to be written. As the title implies, the work is not a systematic treatise on nervous diseases, but a collection of papers on some of the more *prevalent* diseases of the nervous system. Such a scheme has both advantages and disadvantages. On the one hand, it permits the author to address himself more directly to the profession at large, and to attempt to lift his great subject out of the narrow rut of specialism in which some desire to keep it. There is nothing in Dr. Starr's book but what ought to be known to every practising physician and surgeon in the land, and it will have served its purpose well if it helps to make *familiar* some forms of nervous disease which are to many as yet a mystery. On the other hand, Dr. Starr's book may be thought by some, because of its author's self-imposed limitations, to savor of incompleteness. On this we express no opinion, but are content to take the book on its merits, which are many, and to hope that its author may in the ample future rise to the dignity of a more complete treatise.

More than one-half of the book is devoted to a study of the localization of lesions in the cortex, the basal region, and the cord. This is not only the most important half of the book, but for simplicity and brevity it is one of the best clinical studies of the subject of which we have knowledge. It is founded largely upon the author's own clinical and pathological work, which gives it freshness and additional value. The cortical areas governing language are especially well described, with lesions affecting them. The complicated subjects of aphasia, agraphia, word-blindness, and word-deafness are so clearly outlined that it seems to us they cannot be difficult to comprehend, as far, at least, as our present knowledge extends. The localization of spinal cord disease, which has assumed so much importance in recent surgery, is described in two very full chapters, well illustrated. Dr. Starr's well-known studies of the segments of the cord are here reproduced in tabular form.

The surgery of the brain and cord, while not by any means slighted by Dr. Starr, might perhaps have been more fully discussed, and more credit given to the as yet not over-large number of workers in these two fields. Dr. White and Dr. Deaver, both of Philadelphia, have performed notable operations for spinal cord lesion. The latter's case, if we mistake not, was one of the first operated on in this country, and while from the nature of the case the operation was not successful, it threw a not unimportant light upon the subject; while Dr. White's case was followed by quite brilliant results. The author, however, shows a wise conservatism on the subject of brain and cord surgery, which undoubtedly has been in danger of being overdone.

The next most important subject in the book is multiple neuritis, which is treated of rather briefly. The chapter is a concise statement, and seems to us to be an abridgement of Dr. Starr's more elaborate lectures on the same topic published a few years since.

The remainder of the book is mostly occupied by papers by Drs. Skinner, Peterson, Vought, and Goodkind on locomotor ataxia, paralysis agitans, chorea, and the "ordinary forms of insanity." This last-mentioned paper on insanity, by Dr. Peterson, is quite a notable production, in which, if he does not exhaust the subject in fifteen pages, he at least gives a very condensed statement of diseases of the mind. He adopts a classification for the benefit of the "general practitioner."

which German writers would probably regard as a reversion to a lower, or at least a *primitive* type. In this we believe he is in accord with advanced pathological work, and that the future will see a more simple classification of the insanities than some of those now in vogue. All the papers by Dr. Starr's clinical assistants are founded upon cases observed in the Vanderbilt clinic, and are rather in the nature of reports of good work done in dispensary practice than of complete monographs upon their individual subjects.

The book closes with a very timely chapter on electricity as a therapeutic agent. Dr. Starr does not hesitate to show his scepticism on a subject about which too many therapeutists are at loose ends. His conclusions are that static electricity offers nothing beyond an interrupted galvanic current; that the constant galvanic current has electrolytic and cataphoric action, and aids nutritition; that the interrupted galvanic and the faradic currents also aid nutrition; that organic nervous diseases cannot be influenced by electricity; and, finally, that functional nervous diseases are often benefited in an uncertain way by the empirical use of this agent. All of which we firmly believe are correct.

J. H. L.

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A MANUAL OF MODERN SURGERY: AN EXPOSITION OF THE ACCEPTED DOCTRINES AND APPROVED OPERATIVE PROCEDURES OF THE PRESENT TIME. By JOHN B. ROBERTS, A.M., M.D., Professor of Surgery in the Woman's Medical College of Pennsylvania; Professor of Anatomy and Surgery in the Philadelphia Polyclinic; Lecturer in Anatomy in the University of Pennsylvania. 8vo., pp. 800, with five hundred and one illustrations. Philadelphia: Lea Brothers & Co., 1890.

THE title Modern Surgery is entirely justified, for the reader will find very little of tradition within these pages which has not withstood the strong light of recent criticism and investigation. Not a small advantage of a new book is the absence of the necessity for modernizing old material from former editions, and in this instance, from first to last, the thought is essentially modern. Of necessity, much depends upon the personal opinion of the author as to what views shall be given as the best. It is not to be expected, for instance, that all surgeons of to-day will endorse the preference given to the hooks in the treatment of fractured patella. Indeed, many consider their use quite as unjustifiable as our author thinks wiring to be. Not often does it happen, however, that his convictions fail to coincide with generally-received opinion.

The attitude of the work upon the various abdominal and intestinal operations is quite in accordance with late views of the best abdominal surgeons. He counsels early operation, rapidity, accuracy, cleanliness, irrigation and drainage, with little or no opium, and these are the essentials of success.

The section on compound fractures is well up to date, and gives a clear statement of methods and results as seen in good hospitals of the present day. The same is true of the discussion of extensive contused and lacerated wounds. Instead of the arbitrary terms "simple" and

"compound," as applied to fractures, the use of the accurate terms "closed" and "open" is much to be commended.

The chapter on Diseases and Injuries of the Reproductive Organs is very much condensed, as might perhaps be expected in a work of this size. The description of the repair of perineal laceration is not at all clear, nor is it exact. Very meagre attention is devoted to gonorrhœa. The directions for treatment are given in general terms, and the complications are simply named categorically.

A brief, but exceptionally good, account of lithotomy and lithotrity is greatly aided in value by well-made and well-chosen illustrations.

The author is not enthusiastic over the radical cure of hernia, and the operations for it are treated in a cursory way.

The use of the Esmarch bandage to secure "avascularity" prior to amputation is referred to on page 745. The word "avascular" means without bloodvessels and not without blood.

The writer has given considerable attention to the details of plastic surgery, especially of the face, and many of the excellent ideas of his monograph on deformities of the nose are here incorporated. An excellent feature is the frequent giving, in parenthesis, of solution strengths and approximate doses.

In no respect has a greater departure taken place in recent times than in the management of cranial lesions. One of the most distinctive features of the book is the treatment of this subject, to which the author has brought much study and no little experience. He would abandon the use of the term concussion of the brain and substitute contusion or laceration. He states (p. 360) that "the symptoms denominated 'compression of the brain' are probably the evidences of encephalic inflammation rather than of brain compression." The treatment of cranial fracture is admitted to be more heroic than is generally taught. He trephines (see page 361) all fractures which show "brain symptoms," whether simple or compound, with or without depression, and whether fissured or comminuted. Just what these brain symptoms include is not, however, made clear in this connection. The advice is in closed, *i. e.*, simple, fissured fractures without evident depression, but "with brain symptoms," to incise the scalp and trephine. Since, in the absence of depression, fissured fracture cannot usually be found without incision, this is equivalent to saying, Where brain symptoms exist incise the scalp and look for fissures. A more definite statement would be advisable as to what degree of brain disturbance would justify the extensive incision necessary to exclude fissure in many cases. Whether the author does or does not mean compression symptoms, it would be better to say it, if only for the sake of the student and the occasional operator. Careful consideration leads us to think that he does not.

The fractures *without* brain symptoms, for which he may operate, are: (*a*) Either simple or compound fissured fractures with depression. These he possibly trephines, deciding by degree of depression and number of fissures. (*b*) Either simple or compound comminuted fractures without depression. These he probably would trephine; that is, he would do so unless the comminution were inconsiderable. Gunshot, like punctured fractures, are invariably to be trephined. A table is given which is concise and valuable for ready reference, but the author's position is made unnecessarily obscure both by the absence of definition of "brain symptoms" and by the following clause in another

part of the book. When speaking of compression (p. 197) he says: "Depressed bone should be elevated, foreign bodies extracted, pus evacuated by trephining, extravasated blood removed and further bleeding prevented by opening the skull, turning out the clots, and tying the vessel. *These operative procedures are proper only when the existence of compression is clearly established, and its cause and location known*" (italics ours). This last position is that of the older surgeons, and is not consistent with the following extract from the table, for example: "In closed comminuted fracture, with evident depression and *without brain symptoms* (italics ours), incise scalp and trephine." There is difficulty in learning from the work just what the writer's real views are, partly because of peculiarities of arrangement. Some general account of operative indications and contra-indications according to symptoms is given under the heading of localization. Other mention is made under compression, and too little that is definite when speaking of fracture. He looks upon incision of the scalp and trephining as "exploratory rather than therapeutic measures." "Trephining properly performed is in itself so free of danger that in a doubtful case the patient had better be trephined than allowed to run the risk of death, epilepsy, or insanity." On this ground opinions still differ, and time alone, with accumulated statistics of aseptic operations, can decide. The procedures here advocated are possibly safe in skilled hands, such as the author's. In a general work on surgery a clearer statement of other views might not be out of place.

An extremely lucid and sensible discussion of fractures of the lower end of the radius deserves mention. Bond's splint, it is said, should never be used, but the moulded metal splint of Levis, a straight anterior splint with a wooden pad for the radial curve, or a single straight dorsal splint, should be employed.

The book is one of a class which is much needed to-day; a surgery written from the standpoint of an active man who has not been too loath to unlearn the methods of the past.

Especially to be commended is the judgment used in selecting illustrations. Many excellent ones are original and add greatly to the clearness of the text. G. E. S.

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ELECTRICITY IN THE DISEASES OF WOMEN, WITH SPECIAL REFERENCE TO THE APPLICATION OF STRONG CURRENTS. By G. BETTON MASSEY, M.D., Physician to the Gynecological Department of Howard Hospital, etc. Second Edition, revised and enlarged. Pp. xii., 240. Philadelphia and London: F. A. Davis, Publisher, 1890.

THE appearance of a second edition of this little book within a surprisingly short time after the first is a convincing proof of the general interest of the subject. Believing that there is more in the work than would appear from the hasty way in which it has been discussed by former reviewers, we have felt disposed to consider it at some length, in view of the growing importance of the matter of which it treats. The fact that the author is an enthusiast, and that, as such, he has been brought into frequent antagonism with the ultra-surgical party of

gynecologists, should in no way detract from the candid reader's appreciation of his conservative attitude. The results of electro-therapy have been in the main discredited either by those who have allowed themselves to be prejudiced against it without examining into its claims at all, or by others whose adverse criticism has been founded upon insufficient evidence. In this department of medicine, as in every other, the accumulated experience of trustworthy observers should always be accepted as outweighing the results of those who report a few isolated cases. We view with suspicion the deductions of a laparotomist which he bases upon a dozen cases; why should we not be equally distrustful of a writer who, after treating half a dozen cases of uterine fibroid according to Apostoli's method (as he conceives), feels competent to publish a sweeping denial of its value? On the other hand, the intelligent practitioner must be no less suspicious of the electrical enthusiast who affirms that no pelvic affection can resist the influence of the subtle agent which has become such a potent factor in therapeutics.

Since the main features of this manual were set forth in the notice of the first edition it is unnecessary to comment upon them. Much new matter has been added, showing the results of the author's personal experience in the treatment of other pelvic diseases than those which were before mentioned. Over half of the volume is devoted to theoretical considerations, descriptions of apparatus, mode of application, etc., all of which are briefly but clearly stated, as is fitting in a popular work. Chapter V., containing details with regard to the preparation and after-treatment of patients, is especially valuable.

Chapter XI. (including forty-three pages) receives the attention which its importance demands. The author's conclusions, based upon his personal experience of the electrical treatment of these tumors, are certainly not extravagant. He believes that:

1. "A properly-conducted electrical treatment of solid fibroids is harmless, will remove the irritation and pain due to their presence, arrest further growth, and almost invariably cause a gradual diminution in their size. 2. Bleeding fibroids may be entirely cured of the hæmorrhagic tendency and pain, arrested in growth, and gradually lessened in size. 3. It is possible for the diminution in the size of the tumor to end only in its complete disappearance. 4. In small intra-mural fibroids, surrounded by unimpaired uterine tissue, the current applications tend to promote their disengagement from the uterine stroma, and extrusion either into the uterine or peritoneal cavities. In the former case a complete cure may result by a delivery of the tumor, and in the latter case a lessening of its symptomatic importance. 5. The time necessary for a satisfactory shrinkage should not be too sparingly measured with the slow cases. Quick symptomatic cure and slow shrinkage are often associated in the same case. 6. In fibroid tumors that have undergone cystic degeneration a treatment by strong currents may do harm, being apt to set up changes in the liquid contents of the cavities that may result in septicæmia."

The author thinks that the electrical current causes trophic changes in the growth, or, as he happily expresses it, "the electrical applications are like blows upon a nerve containing trophic filaments, which are followed by degeneration and absorption of the supplied area in proportion to the injury." He properly prefers intra-uterine cauterization to electro-puncture per vaginam, reserving the latter for cases in which

the cavity is so small that an electrode cannot be introduced, or in which the tumor is subperitoneal and pedunculated. Very hard tumors are less adapted for electrical treatment. The best results are to be expected in the case of submucous fibroids. Several cases are reported showing the favorable results obtained, especially as regards the relief of hæmorrhage, the tumor in every instance being considerably reduced in size.

Chapter XII., on uterine hæmorrhage, is condensed but valuable. The results obtained by the author in the electrical treatment of chronic endometritis are certainly most encouraging; but even conservative gynecologists would question the possibility of curing an extensive bilateral laceration of the cervix without an operation. In introducing the important chapter on chronic inflammatory diseases of the uterine appendages the author throws down the gage to the laparotomists. He is not far from right when he says that "a conservative reaction from this war-time in abdominal surgery may be predicted with confidence." On the other hand, however positive may be the results obtained in the electrical treatment of ovarian troubles, we can hardly assent to the view that a well-recognized pyosalpinx should be treated by the electrode instead of the knife, even though there has been no recent perimetritis.

With the author's remarks on pelvic pain we are in full accord, though it is a matter for regret that so little space is assigned to this important subject. We believe that in the relief of this symptom the electrical treatment has achieved its greatest triumphs, as opposed to empirical surgery, and it is reasonable to suppose that its benefits will in time be so generally recognized that laparotomy, as a tentative measure, when no serious organic disease is recognized, will in the near future be regarded as absolutely contra-indicated. Under the section on "Menorrhalgiæ" (a term which is suggested as a substitute for dysmenorrhœa, though it presents no striking advantages over the latter) the author discusses the etiology of painful menstruation, which he designates somewhat vaguely as "almost entirely a neuro-muscular phenomenon." "Menorrhspasm," or spasmodic contraction of the os internum, is described in rather ponderous terms as "a neuro-myotic storm of the uterine neuro-muscular apparatus, which renders the excretion of the menstrual fluid temporarily impossible." This theory is tenable, but there is danger that the general reader may infer that divulsion is an operation to be entirely abandoned. Much as it has been abused, we would be sorry to see such conclusions drawn, since in a certain class of cases (especially when the question of sterility is concerned, as well as that of dysmenorrhœa) there is a permanent mechanical, as well as a purely spasmodic, obstruction of the cervical canal. The author's views regarding the inadvisability of hasty resort to local treatment in the case of young girls meet with our hearty approval.

In the chapter on the electrical treatment of uterine displacements expression is given to the belief that there is a future for this method in cases of prolapsus due to relaxations of the muscular supports of the uterus. This we must admit when we reflect how much has been accomplished by pelvic massage, which is necessarily less efficient in its action.

Chapter XVII., on extra-uterine pregnancy, is brief, and somewhat disappointing in view of the importance which this subject has assumed of late. We are pleased to note that the author, unlike some enthusiastic electro-therapeutists, recognizes the fact that there are limitations

and contra-indications to the application of his favorite agent. He does not extend its use to pelvic abscess, hæmatocele, and cysts of the ovary and broad ligaments. In fact, his claims are, with few exceptions, reasonable and are urged in a calm, judicious spirit, which commends itself to the impartial reader far more than intemperate advocacy of any method.

This work is necessarily limited in its scope, and is much condensed. For the general practitioner the theoretical predominates a little too much over the clinical. We have our doubts as to the propriety of advising practitioners to procure and use the nice apparatus needed in the electrical treatment of uterine fibroids. Personally, we believe that even gynecologists would do better to entrust their cases to special workers, who have the time and experience necessary to test thoroughly the value of this treatment. The tendencies of the average gynecologist are too surgical to allow him to spend the time which should be devoted to Apostoli's method before it becomes evident that a given case cannot be benefited except by an operation. On the other hand, the application of electricity to ovarian and pelvic neuralgia requires less complicated apparatus, less special skill, and may well be entrusted to the general practitioner.

The author does not promise too much, but calls attention clearly to the fact that there is still much to be learned regarding the special application of this agent in gynecology.

Modest and unpretentious as it is, the book is a valuable addition to the literature of gynecology, and deserves the general approbation which it has received. H. C. C.

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DESCRIPTION OF THE JOHNS HOPKINS HOSPITAL. By JOHN S. BILLINGS, M.D. Baltimore, 1890.

TIME and space will permit only a brief notice of the splendid edifice of the Johns Hopkins Hospital. It stands the model hospital of the world, as perfect as art and science and munificence can make it in our day. The handsome volume which describes it is itself a triumph of skill. It contains, besides a concise narrative of the inception, construction, and completion of the hospital, the addresses delivered at the opening of the institution, May 7, 1889, by Francis T. King, President of the Board of Trustees, and Dr. John S. Billings, who has been from the first the moving spirit, the *genius loci*, of the entire evolution. To the text of the volume are appended fifty-six elaborate plates that serve to illustrate every detail of the structure.

It is not likely that this great hospital will be many times duplicated. The ignorance and poverty of municipalities will long hinder the establishment in our large cities of public buildings like these; and few private charities can compass such results. But the influence of such an exemplar will be far-reaching and permanent. Already, before a single stone had been laid, the construction of hospital buildings throughout the country was modified by the crude preliminary plans that were drawn up at the instance of the trustees of the Hopkins

legacy. No one now, in any part of the civilized world, can think, or talk, or act in the matter of hospital construction without taking into account the Johns Hopkins Hospital.

We may not, however, dismiss this subject without first considering whether it be desirable to seek the universal adoption of the plan upon which this hospital is constructed. Undoubtedly, it furnishes an admirable institution for the display of the highest resources of the healing art, and for the acquisition of knowledge regarding disease. It is well to have in this country, at least, one such hospital. But, is it worth while to rear in every city such expensive edifices for the accommodation of the sick? We think not. Experience indicates that buildings like the New York Hospital, or like the new Presbyterian Hospital in Chicago, will afford equally satisfactory results with but a tithe of the expense. After all this vast outlay of over two millions of dollars, the Johns Hopkins Hospital will accommodate only two hundred and twenty-five patients; while the Chicago Presbyterian Hospital accommodates one hundred and seventy-five patients, about equally distributed between common wards and private rooms, in a fire-proof building that did not cost over two hundred and fifty thousand dollars. For this sum an edifice has been erected, in the form of the capital letter F, upon a lot measuring 150 x 170 feet, with basement and five stories, open to light and air in every direction. The kitchen is placed in the fifth story; the boiler and the laundry occupy a detached building; and yet, room has been found for a pleasant lawn beside the hospital. Wide halls and excellent ventilation make the entire structure airy and cheerful; while perfect cleanliness and careful attendance have, during the last hospital year, reduced the mortality among 1351 patients to 6.43 per cent. Results like this should make one pause before deciding upon the Baltimore plan as the only *ne plus ultra* in hospital construction.

H. M. L.

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THE MILROY LECTURES FOR 1890. THE CAUSES AND PREVENTION OF PHTHISIS. By ARTHUR RANSOME, M.D., M.A., F.R.S., Hon. Physician to the Manchester Hospital for Consumption and Diseases of the Throat. London: Smith, Elder & Co., 15 Waterloo Place, 1890.

THIS volume of 146 pages contains as much information upon the subject of phthisis as could well be crowded into so small a compass. The importance of the subject in the mind of the author may be seen by the following lines from the first page of the book: "Tubercle, in its various forms, at the present day, carries off annually nearly 70,000 persons. In the form of phthisis, at ages between fifteen and forty-five —the most useful stages of human existence—it kills more than one-third of the people who die, and nearly half between fifteen and thirty-five."

He then goes on to give a most excellent summary of the changes in modern thought in regard to the disease, in respect to its etiology, communicability, and methods of transmission, as well as some outline wherein modern ideas must differ from those of the older pathologists. It is unfortunate, however, for the sake of exactness in diction, that the

author has made the common mistake of using the words "phthisis" and "tuberculosis" as interchangeable; a fault the more to be regretted for the reason that it is upon such errors as this that all the opposition there is to the specific nature of the bacillus of tuberculosis is mainly based. Of course, it is known that there may be phthisis which is not due to the activity of the bacillus of tuberculosis, but so little stress is laid upon this fact by clinical writers, that the subject is still in some confusion from that cause.

Information in regard to the distribution of phthisis (tuberculosis), its destructive effects upon the human race, its predisposing causes (atmospheric, climatic, etc.), and some of the proper methods for its prevention can hardly be found in a more compact form, however, than in this book. Especially interesting are a chart showing the geographical distribution of phthisis, one showing the distribution of the Lepra Hospitals of the British Isles during the Middle Ages, and one showing the distribution of phthisis according to the rate per thousand of living.

H. C. E.

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LYMPH-STASIS, OR RETARDATION OF LYMPH AS AN ELEMENT IN THE CAUSATION OF DISEASE, ESPECIALLY IN REGARD TO SCROFULA AND TUBERCULOSIS. By WAYLAND C. CHAFFEY, M.D., London; Fellow of the Royal Medical and Chirurgical Society and Member of the Pathological Society of London, etc. (Graduation Thesis with Appendix.) London: H. K. Lewis, 136 Gower St., W. C., 1890.

BEARING upon the same subject as the preceding in a general way, comes the little book with the above title. The drift of the author's argument can be best seen by an extract or two. Alluding to the "almost constant presence of caseous material in some part of the body in cases of tuberculosis," after some explanatory remarks, he asks the question "Is the general infection independent of the caseous glands as a *focus*, in some cases, at least, and due to the subsequent introduction from without of the same species of microbe that was resident in the caseous gland?" and says: "This last view I am induced to believe is the correct one." "My observations lead me to believe that it is generally by its retarding effect upon the lymph-current of an organ that the caseous gland renders the part depurated, specially vulnerable to the attacks of the disease germs in general, the bacillus of tubercle included." This retarding effect upon the lymph-current by caseous areas is the basis of the statements that the author makes, and which he supports by evidence drawn from records of more than 105 autopsies which are tabulated at the end of the book. Short extracts from such a work give a very poor idea of the argument, and as to the foundation of this latter the best judgment can be formed only by seeing the original. The ideas are good, however, and it is possible that they form an explanation of some of the difficult problems that confront the pathologist for solution in the study of the morbid changes occurring in disease.

H. C. E.

# PROGRESS

OF

# MEDICAL SCIENCE.

## THERAPEUTICS.

UNDER THE CHARGE OF

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### The Pharmacology of Morphine and its Derivatives.

It is agreed that the central nervous system is the part primarily affected by morphine, and the symptoms which it produces are described as divisible into a narcotic and tetanic stage.

In the descriptions of the morphine actions hitherto published it has always been assumed that the occurrence and sequence of the two stages of narcotism and tetanus are a necessary result of the action of the drug in the nerve-cells, the explanation given being that morphine first depresses and then stimulates the spinal cord.

In an investigation by Stockman and Dott it has been found that the sequence of depression and tetanus is entirely a question of dosage, and of how much morphine actually reaches the spinal cord.

In the present state of our knowledge it would be useless, even to speculate, as to what changes morphine brings about in the nervous system, small amounts of the alkaloid coming in contact with the gray nerve-cells interfere with their vitality and chemical changes only in so far as to inhibit or depress their proper activity, whereas larger amounts cause much more profound changes, apparently leading to irregular and violent chemical action within them, which leads to similar irregular and violent discharges of nerve energy, followed by exhaustion. During the first condition the cells are more or less incapable of conducting impulses or of acting reflexly, whereas, in the second, they are completely changed in these respects, and respond vigorously to the slightest impression. It is impossible to characterize the changes more definitely.

With regard to the action of morphine on motor nerves, great differences of opinion have been expressed by different authors. The older observers, finding that the motor nerves were considerably depressed in electric irrita-

bility at the end of the poisoning, concluded that the alkaloid had a directly paralyzing effect on the end organs. Stockman and Dott find that very large doses of morphine do paralyze the terminations of motor nerves, but ordinarily death ensues before the depression is marked. With therapeutic doses in man it is hardly possible that even a trace of this action is present.

With sensory nerves the state of affairs seems to be much the same—that is, if large doses could be applied directly to the nerve terminations, the morphine would act as a paralyzant to the nerve tissues, but by the ordinary methods of administration its effect is practically *nil.*

*Codeine.* Codeine is the methyl ether of morphine, a molecule of methyl having replaced one of the hydrogen atoms. Its action is exerted on the central nervous system, and has a close resemblance to that of morphine. It causes an evident narcotic stage, followed by a condition of increased reflex excitability which amounts to tetanus if the dose be large enough. The narcotic stage is, however, shorter and much less deep than with morphine, and if large doses be given to animals, is often hardly noticeable, or may be quite absent. In man the narcotic effect is feeble; very small doses depress the spinal cord, this being succeeded by an increase of reflexes; while larger doses cause tetanus, either at once or after a stage of depression. On motor nerves its paralyzing action is very decided. The narcosis is always slight; the animal can be easily aroused. There is no very marked analgesia, and when the dose is increased, this, instead of deepening the narcosis, causes a condition of reflex excitability.

*Ethylmorphine.* This substance is the ethyl ether of morphine, and is analogous to codeine. Bochefantaine has published a short paper on its physiological action, which he describes as being exactly similar to that of strychnine. He used such large doses, however, that he missed the preliminary narcotic effect. Stockman and Dott have concluded that ethylmorphine has an action similar, or nearly so, to that of codeine. If the dose be properly chosen, one can easily distinguish in animals a narcotic and a tetanic stage.

*Amylmorphine.* Its physiological action was found to be similar to that of the two preceding bodies.

In these three bodies, methyl-, ethyl-, and amylmorphine, the same hydrogen atom in morphine has been replaced by an alkyl radical. They are, therefore, substitution derivatives. We find that the action of all three substances is practically identical, and it seems quite indifferent which radical is introduced so long as it replaces the same H atom. Theoretically, there is possibly a difference in the actions of the three substances, but it must be entirely quantitative not qualitative. In all the narcotic action of morphine is much diminished; the tetanic action and the action on motor nerves are increased; while the lethal dose, on account of the tendency to convulsions, is much smaller. This action is, however, of essentially the same nature as the morphine action; that is, the same parts of the central nervous system are affected, and in the same way, but not in the same degree.

Other substances, such as acetylmorphine, diacetylmorphine, benzolmorphine, and dibenzolmorphine, were compared to morphine, and their action was found to be the same in kind, differing only in degree. Their tetanizing power is much greater, while their narcotic action, although visible after

smaller doses, is never nearly so profound. Increase of dose, instead of deepening the narcosis, brings on tetanic symptoms. The depressant action of small doses on the cord, and especially on the respiratory centre, is very much greater than that of morphine.

Compared with codeine, they induce an equal narcotic effect with about one-tenth of the dose; while about a three-times-larger dose is necessary to cause tetanus.

Several chlorine derivatives of morphine were examined, which all showed the characteristic actions of morphine on the central nervous system. In addition they act more or less energetically as muscle-poisons, soon destroying the contractile power of the voluntary muscles with which they first come in contact at the place of injection, and more gradually affecting the other muscles of the body. Chlorine, it is well known, is a powerful muscle-poison, and its introduction into other groups makes the bodies so formed marked paralyzants of muscular tissue.

The research was undertaken with the view of determining the influence of chemical change in the physiological action of certain alkaloids. From the examination of one substance it is unwise to draw any wide-reaching, general conclusions. It seems certain that so long as the chemical changes are restricted to what may be called the outlying groups of the molecule, very little alteration takes place in the physiological action. The change which does take place does not depend so much on the substituting body as on what part of the molecule is substituted. When a change is made in the kernel or groundwork of the molecule, then the action is much more profoundly altered.—*British Medical Journal*, July 26, 1890.

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### Treatment of Nocturnal Incontinence in Children.

The following simple theory to explain one of the causes of nocturnal incontinence and its equally simple treatment will interest many who have to treat this often trying and inconvenient habit.

Dr. van Tienhoven, of The Hague, suggests that in these patients, though the bladder acts normally through the day, it misbehaves at night. The question is, Shall the musc. detrusor urinæ or musc. sphincter vesicæ, or both, be blamed? Dr. van Tienhoven believes that the musc. sphincter is not strong enough to keep back the urine which collects in the bladder in the early hours of the night and permits it to find its way into the prostatic portion of the urethra. The musc. detrusor is thus reflexly stimulated and the bladder is emptied.

In order to prevent the urine from running into the urethra in this way the children were made to sleep with the pelvis elevated. In this position the bladder is capable of holding a certain amount of urine before the liquid reaches the level of the urethral opening.

The foot of the bed must be elevated so that the bed forms an angle of forty-five degrees with the horizontal. The children should be sent to bed with empty bladders, and should not take any liquid just before retiring. They sleep well in this position and do not complain. Fourteen cases were treated by this simple method only, and were cured in a short time.—*Correspondenzblatt für Schweizer Aerzte*, No. 18, 1890.

### Intestinal Antisepsis in Typhoid Fever.

The following treatment is recommended by Professor Teissier, of Lyons: Morning and evening a capsule of seven grains of alpha-naphthol, with salicylate of bismuth. Sponge-bath once in twenty-four hours. To restore the action of the kidneys after the mid-day sponging, a rectal injection is given of one drachm of the extract of cinchona, and eight to fifteen grains of the sulphate of quinine dissolved in sulphate of valerian. The diet is restricted to Bordeaux wine, milk, and broth.

The author states that he has employed this treatment in fifteen cases of typhoid fever, some of which were of exceptional severity, one case only dying, due to suppurative nephritis occurring at the close of the disease. In almost all of these cases complete antisepsis was realized about the fourth day of the treatment, this being recognized by the green tint of the urine. The temperature was lowered progressively, the albuminuria disappeared, the spleen regained its normal volume, and the tongue became moist and lost its furred condition.

After a regular fall of temperature there then occurred a series of marked thermic oscillations, lasting from four to eight days, the patient then passing to the stage of convalescence, a stage of the disease which was remarkably short. He further adds that through all the duration of the treatment the typhoid aspect was wanting.—*Therapeutic Gazette*, No. 10, 1890.

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### Toxic Effects of Castor Oil.

Fewer drugs have a more established reputation for mild and safe operation than ol. Ricini. Yet it would seem that occasionally it may play tricks, for which it is well to be prepared. Dr. C. Hanfield Jones reports four cases in which syncope occurred after using castor oil in moderate doses. The patients were robust and the syncope was not the result of hypercatharsis.—*The Medical Press*, No. 2671, 1890.

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### Secretion of Iodides and Salicylates.

Professor Rosenbach and Dr. Pohl have studied with care the channels of secretion of the iodides and salicylates, and the result of their investigation is of practical interest and value in the use of these remedies.

To ascertain if the salicylate of sodium and the iodide of potassium were secreted by synovial fluid this fluid was tested for these salts, after death, in patients who had been taking these remedies just previously. The salicylic reaction was found, but the iodide was not present in the synovial fluid. A young man who had acute rheumatism, with fluid in the knee-joint, was given salicylate of sodium, and later some synovial fluid was drawn off, and when tested gave the salicylic reaction. In several patients with pleuritic effusion, who took both the iodide and the salicylate, the salicylate was found in the pleuritic fluid, but not the iodide.

Further tests were made on patients with nephritis, with ascites, and œdema.

Their experiments show that the salicylates are found not only in the urine

but also in the serous fluids of the body, normally, and when serous effusions occur. The salicylates are also found in œdema and in exudates containing pus, though in the last in small amount only. Salicylate of sodium was not present in the saliva, in the gastric juice, or bile.

On the other hand, the salts of iodine, given by the stomach or subcutaneously, are found in the urine and saliva, and, like the salicylates, in transudations into the skin, abdomen, and pleura; they are, however, not found in serous exudations or in those containing pus. Even when administered in large doses to healthy and diseased individuals, they were never present in the synovial fluid.

The iodides and salicylates differ from each other in this respect, that when the salicylates are administered they are widely distributed in the system, and may be found in all serous cavities as well as in the urine, while the iodides, on the contrary, are found only in transudations and never in normal or inflammatory effusions into joints or serous cavities.

The authors infer from such facts that the iodides are, therefore, useless in the treatment of articular rheumatism or inflammation of the pleura or peritoneum, since they do not reach the site of the disease; and, further, that since the salicylates are found in these cavities, they should be used not only in articular rheumatism but in inflammatory conditions of serous membranes.

Where the larger cavities are involved, as in pleuritic effusions, the authors recommend large doses of the salicylates, or their administration directly after thoracentesis. In fact, the injection of the salicylates into the cavity after tapping seems to have some advantages.

They believe that the rapid and successful course of a series of cases treated in this manner was the result of the administration of the salicylates combined with thoracentesis.—*Berliner klinische Wochenschrift*, No. 36, 1890.

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### Some New Clinical Experiments with Diuretin.

Koritschoner has recently made numerous clinical trials at the medical clinic of Professor Schrötter, of Vienna, with the new diuretic *diuretin*, which is a mixture of sodium salicylate and theobromine. These experiments pertained to thirty-eight cases of general dropsy. Ten of these were cases of cardiac dropsy from chronic valvular disease; twelve cases were of dropsy from Bright's disease in some stage; in six the general anasarca was due to dilatation of the heart following emphysema or arterio-sclerosis; in four the cause of the dropsy was degeneration of the myocardium; in three it was hepatic cirrhosis; in two it was tuberculosis of the lung and serous membranes; and in one, cancer of the liver.

The formula which Koritschoner uses is as follows:

| | |
|---|---|
| Salicylate of soda and theobromine . . . | ʒj to ʒij. |
| Warm water . . . . . | ℥v.—M. |

Dose, a teaspoonful every hour or every two hours.

Diuretin should be given in rather large doses—little benefit can be expected from a less quantity than four grammes (sixty grains) a day; ordinarily, to get the full advantages of the drug, medium doses amounting to five or six, and maximum doses amounting to eight or ten grammes, in the twenty-four hours, should be administered.

Diuretin is generally well supported, even when its use is prolonged for months. It rarely causes nausea, even in chronic Bright's disease, when the appetite is gone, and but little food is tolerated. It does not cause vertigo; in rare instances patients complain of palpitation and temporary cardiac distress. Sometimes diuretin provokes diarrhœa.

As a result of these trials by the Vienna physician, salicylate of soda and theobromine was found to be a very powerful diuretic, and in only five cases did it prove to be without action; these were cases of chronic Bright's disease, arterio-sclerosis with fatty myocardium, tuberculosis of the lungs and of serous membranes—all had arrived at the last degree of cachexia, and succumbed in a few days after their admission to the hospital. In ten other cases, the action of the salt was much superior to that of digitalis, acetate of potash, and all other diuretics that had been administered, though but moderate benefit followed the administration of the remedy. In the majority of the patients (twenty-three out of thirty-eight) the effect obtained was excellent, the dropsical effusions rapidly disappeared, and general amelioration followed. There is some danger under the abundant diuresis caused by the drug, the ascites and œdema may disappear so rapidly as to cause dangerous collapse. On this account, Koritschoner urges that in cases of abundant effusions the remedy should be given with caution; he would, in fact, advise always to begin the treatment by a dosage of one drachm a day, and if this quantity makes no sensible increase in the urine, it may be augmented by fifteen grains a day till a sufficient result is obtained.

The diuretic action of this medicine is said to be more marked in cardiac dropsies than in renal or hepatic, yet it may render precious service in chronic Bright's disease. In fact, in this disease, where all the ordinary diuretics are apt to fail, the quantity of urine excreted often becomes augmented five or six times under the influence of the salicylate of soda and theobromine. In some cases of Bright's disease the remedy seems to exert its principal action in the intestines, producing an abundant serous diarrhœa, which, in a very short time, causes the œdema to disappear, without too great enfeeblement of the patient.

According to the researches of Schröder and Gram, the diuretic effect of the salicylate and theobromine is due to the excitant action of the drug on the renal epithelium. As the epithelium is the principal seat of lesion in chronic parenchymatous nephritis, it might be feared that diuretin would be injurious in Bright's disease. The observations of Koritschoner show that this fear is not well founded, and that diuretin excites the renal functions without exciting the kidneys. Thus, in two cases of acute scarlatinous nephritis when Koritschoner gave diuretin in large doses, the patient recovered with astonishing rapidity, and without any complications. Under the influence of the medicament, the blood corpuscles and hyaline casts were seen from day to day to disappear from the urine. This same favorable action of diuretin on the nephritic processes has also been noted in chronic Bright's disease.[1]

The new drug has not as yet—as far as we have been able to ascertain—been much introduced into this country, and as theobromine is very expen-

[1] Wiener klin. Wochschr., September 25, 1890; Semaine Médical, October 15, 1890.

sive, and as the cost of a drug is an important item in the economies of many physicians and their patients, it is doubtful whether many serious trials will be made with diuretin for some time to come.—*Boston Medical and Surgical Journal*, No. 18, 1890.

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## MEDICINE.

UNDER THE CHARGE OF

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### Aphasic and Amnesic Defects of Speech.

Bastian (*Lancet*, 1890, i. 1163) calls attention to the importance of a systematic and uniform mode of examination in the effort to discover the exact nature of a speech defect; as, unless this be made, a detailed diagnosis is extremely difficult. Speech defects of different kinds result from lesions in very different parts of the brain. While words are the vehicles of intellectual expression, the memory for words is fourfold, the four forms of verbal memory being registered in different parts of the cerebral hemispheres, the several centres being connected by commissures, and being called into activity by different combinations, according as we are listening, reading, writing, or speaking.

The four forms of verbal memory are these: (1) The auditory memories of words, which, we may say, are registered in the posterior part of the upper temporal convolution; (2) The visual memories of words, registered in some unknown part of the occipital lobe; (3) The glosso-kinæsthetic memories of words, or the memories of our articulatory sensations, which he believes to be located in the posterior part of the third frontal convolution; (4) The cheiro-kinæsthetic memories of words, or those of the sensations connected with writing movements, which he believes to be registered in the hinder part of the second frontal convolution. These last two centres are the sites from which, in speaking and writing respectively, volitional incitations issue through descending internuncial fibres, so as to arouse in appropriate modes the true motor centres situated in the medulla and spinal cord. He believes that the action of these last, as of all motor centres, is entirely devoid of all sensory accompaniments—that is to say, whilst movements are invariably preceded and incited by processes taking place in sensory nerve elements, and whilst the excitation of the movements invariably gives rise to a body of ingoing impressions (kinæsthetic) emanating from muscles, skin, joints, etc., the actual nerve processes excited in the motor centres proper are devoid of any conscious accompaniment, and are wholly incapable of independent memorial recall. What he calls "motor centres proper" are commonly called lower motor centres. "Kinæsthetic centres" is his term for the cortical motor

centres, since he is of the opinion that no motor centres exist in the cerebral cortex. He thinks that in what are termed cortical motor centres sensory results of different movements are registered, and that the reëxcitation of these centres constitutes the necessary antecedent—the veritable stimulus—for the reproduction of the movements to which they are related. The excitation of these parts of the cortex constitutes, in fact, the terminal part of a voluntary act, so far as it had to do with the cortex. The precise mode of ideally-revived activity here and in other sensory centres gives rise to correspondingly precise stimuli, which, passing downward to the true motor centres, constitutes the volitional incitations for the desired movement.

The activities of these different word-centres are almost never called into play singly; for the most part, two or three of them are roused through commissural fibres almost simultaneously, though really in rapid succession. Thus, we think in words, whether the result is to be silent thought, speech, or writing. In the first case the activity is mainly in the auditory centre, though diffused to some extent in two directions—that is, toward the glosso-kinæsthetic and the visual word-centre. If the thought is to issue in speech the stimulus in the former direction is much the more powerful, and the conjoined activity of the two centres suffices to rouse the motor centres for speech. If, on the other hand, the thought is to issue in writing, the activity of the auditory centre is immediately followed by a powerful action in the visual word-centre, and this again by activity in the cheiro-kinæsthetic word-centre, whence volitional stimuli issue for the production of writing movements. There appears always to be a prior activity in the visual or auditory word-centres, before the two kinæsthetic centres are called into activity.

In the examination of all cases of speech-defect we have to test in a systematic manner the integrity of these different word-centres, of the commissures which unite them, of the internuncial fibres issuing from the cortex, and of the true motor centres in the bulb. (*a*) If the patient understands what is said to him, and can repeat words which he has just heard pronounced, it shows that the auditory and glosso-kinæsthetic centres, with the commissure between them, as well as the outgoing channels and the corresponding motor centres, are free from serious damage; (*b*) If the patient can understand written speech, and can copy a word which has been written before him, it shows that the visual and cheiro-kinæsthetic centres, with the commissure between them, as well as the outgoing channels and the corresponding motor centres, are free from serious damage; (*c*) If the patient can read aloud or name objects at sight, it shows that the visuo-auditory commissure must be intact; (*d*) If the patient can write from dictation, it shows that the audito-visual commissure must be undamaged.

The author doubts the existence of any "centre for conception of ideas." He believes that the supposed necessity for assuming the existence of any such centre may be obviated by a fuller recognition of the different degrees of excitability of the auditory word-centre, and by the fact that when its excitability is lowered to different degrees, very different kinds of speech-defect are produced. Thus, where there is a slight lowering of the functional activity of the auditory centre we have a slight amnesia, with forgetfulness of names of persons and things; where the defect is graver the power of spontaneous speech may be nearly obliterated, though imitative speech may be retained and the

patient be able to read aloud fluently—*i. e.*, the auditory centre is only capable of reacting on receipt of a strong external stimulus, or of one coming to it from the visual word-centre; whilst, finally, if the auditory word-centre is entirely destroyed, there is entire word-deafness with complete aphasia.

He then reports a case in which there was lowered excitability of the auditory word-centre, preventing any other than the smallest amount of spontaneous speech, together with some aphemic difficulty in the mere utterance of words; though the main and most interesting defect was due to a lesion severing the two commissures between the auditory and visual word-centres. The patient could, namely, understand perfectly all that was said to him, or all that he read, but could neither write nor speak spontaneously, except to a very limited extent. He could, however, repeat words spoken to him, or copy those written. Moreover, (1) he could not name at sight or read aloud a single letter, nor (2) could he write a single letter from dictation. These two symptoms show that the two commissures between the visual and auditory word-centres had been damaged in some part of their course.

Finally, the author defines the various forms of speech-defects. In aphemia the patient can write freely. The condition may be incomplete, and then the utterance is more or less blurred or indistinct; or it may be complete, and then he is absolutely dumb. Here the lesion is not of the cortex, but of some part of the internuncial fibres as they pass downward from the third frontal convolution to the motor centres of the bulb. In *aphasia* the power of speech and writing are generally nearly lost, and there is usually some interference with thought. As regards the seat of the lesion in simple aphasia, he claims that the localization of Broca is clearly inadequate, and that there is absolutely no clinical difference between the aphasia produced by a lesion in the posterior part of the third frontal convolution and that which may be produced by a lesion in any part of the commissure connecting it with the auditory word-centre. Where a destructive lesion involves the auditory word-centre there is *word-deafness with aphasia*. Such a patient's mental condition is profoundly altered; he can neither speak nor understand speech, and, since words are first and principally revived in the auditory word-centre, thought in words is no longer possible; and since the revival of words in the visual centre could not be reinforced by their revival in the auditory centre, the comprehension or use of printed or written words no longer exists. In *commissural amnesia* the commissures are damaged between the auditory and visual word-centres, and the patient is consequently no longer able to name and read at sight, or to write from dictation. A lesion in the visual word-centre gives rise to *word-blindness with agraphia*. The patient may be quite unable to understand either written or printed language, but can comprehend spoken language, and can both think and speak. In *agraphia* the patient can speak and read, but cannot write. There is little or no interference with thought. The lesion is one of the cheiro-kinæsthetic centre situated in the posterior extremity of the second left frontal convolution, but a damage to any part of the commissure connecting this with the visual word-centre would produce exactly the same defect, since the stimulus must pass from the latter to the former centre.

The author does not countenance the division of aphasia into "motor" and "sensory." The defects are in all cases in the sensory centres, or in the com-

missures between them; excepting in the case of aphemia, where, as stated, it is in the internuncial fibres passing from the third frontal convolution to the motor centres in the bulb. The fact that a paralytic disability is produced does not in any way prove that it is not due to a defect in a sensory centre, or in a commissure between two such centres; it is here, in fact, that we have to look for the sources of the volition.

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STUDIES ON ULCUS VENTRICULI SIMPLEX, GASTROMALACIA, AND ILEUS.

TALMA (*Zeitschr. f. klin. Med.*, 1890, xvii. 10) reviews briefly some of the various views which have been held regarding the mode of origin of ulcer of the stomach and of gastromalacia, showing that even yet little definite knowledge is possessed regarding it, and that the majority of writers consider that gastromalacia never occurs before death.

The author has undertaken a series of experiments upon animals with reference to this subject and to the relation of these lesions to ileus. These he reports in detail. The procedure followed consisted in the ligation of various parts of the intestinal tract; sometimes of the œsophagus and duodenum, sometimes of the duodenum alone or of some other part of the large or small intestine, sometimes in the separation of a loop of small intestine by a double ligation. Great swelling of the abdomen resulted in nearly every instance; due almost always to accumulation of fluid above the ligature. Gas was found in some cases, partly the result of the swallowing of air, partly due to fermentation. Investigations showed that these fluid contents of the intestinal tract consisted chiefly of the gastric secretion. The amount of hydrochloric acid poured out after the ligation of the duodenum appeared to be abnormally great. If the ligature was lower in the intestine, the secretion of the intestinal glands was also present, but it is uncertain what proportion of the fluid this formed. The nature of the fluid poured out by the intestine, and the character of the lesions seen both above and below the point of ligation seemed to depend largely upon the character of the gastric and intestinal contents at the time the experiment was made. Whatever the correct explanation may be, it is certain that very grave alterations often develop in the portion of the intestine below the ligature.

The results of closure of the large intestine were somewhat different from those just described. The animals lived longer, the distention of the abdomen was not so marked, and the fluid had accumulated in the large intestine, leaving the small intestine and stomach entirely empty. The marked power of the large intestine to absorb water was doubtless the reason that no more fluid was present. Fæcal changes take place in the substances blocked up in either the large or small intestine, but not in a loop of the bowel which has been cut off by a double ligature. From this the author concludes that the change is either due to ferments introduced with the food, or that it can take place only in ingesta which have undergone a certain degree of alteration. The production of the fæcal character took place first in the portion of the contents nearest to the ligature.

The curative influence of vomiting was seen in the fact that rabbits, which do not vomit, died quickly through overfilling of the stomach, while dogs lived several days, because they do vomit. The practical deduction from this is that patients with ileus, who vomit with not too great labor, should frequently

have administered to them large amounts of warm water, combined with the employment of other uninjurious means of inducing vomiting. In nearly all the rabbits experimented on there was a profuse secretion of mucus. The object of this was clearly to protect the delicate glandular tissue from injurious influences. The cause of death in his experiments appeared to be nearly always the absorption of material from the intestine poisoning the economy.

The studies of the author lead him to the following conclusions more directly bearing upon the nature and cause of gastromalacia and ulcer of the stomach. He claims that gastromalacia develops under two circumstances: 1, the presence of chemically-altered gastric contents; 2, a high tension of the stomach wall. As a result of the latter there are produced in the gastric wall, especially in the mucosa, widespread hæmorrhagic infiltrations, necrosis, etc. Gastric contents, containing even a very small amount of hydrochloric acid, produce changes in the soft parts. The stronger the chemical action of the secretion the more rapidly do infiltration and necrosis and also the softening follow. Gastromalacia, as seen in rabbits experimented on, occurs principally in the fundus, since the resistance of the muscular wall to the pressure is least here, and the circulation is most interfered with; the interference with the circulation is the chief cause of hæmorrhages, etc. The great stretching of the wall of the fundus, and probably of the bloodvessels contained in it, is the reason that the gastromalacia is found only in this region. Probably the less degree of resistance of the mucosa in this part is not without influence. The malacia is denominated "white" when it develops without previous hæmorrhage.

In addition to the malacia, ulcers in various stages of development are found. These are due to extreme restriction of the circulation. Through this restriction there can either arise: 1. Large hæmorrhages under the mucosa, separating it from the muscular layer and causing its death; or, 2. Hæmorrhages into the mucosa, likewise producing its necrosis. As a result of softening of the necrotic parts under the influence of the gastric secretion, larger or smaller ulcers are produced.

Often, however, ulcers arise without previous hæmorrhage; and these are to be regarded as the result of softening.

The deductions from these experiments and from the nature of the isolated cases which have been reported lead the author to the conclusion that the brown gastromalacia arises in man usually, if not always, during life; though death may so rapidly follow that there is no time for the development of secondary inflammations and the like. Autopsies show that malacia in man is situated nearly invariably in the fundus.

With regard more particularly to the production of ulcus ventriculi in men, the author reports several cases in which painful tonic spasmodic contraction of the stomach wall—not the intermittent peristaltic contraction—was almost certainly the cause of ulceration and hæmorrhage; and he further refers to the frequency with which spasm of the stomach is witnessed in hysterical women, diseases of the central nervous system, and hypersecretion of the gastric juice.

Experiments were then made on animals to determine the cause and nature of this gastric spasm; and these appeared to prove that irritation of the left vagus developed a powerful contraction of the stomach, which, if long-continued, would produce round ulcer of the stomach, penetrating

the mucosa, and sometimes the muscular layer. It seemed, in fine, proven that the contraction of the wall of the stomach in the pyloric region was soon followed by necrosis of the mucosa, and this by the development of an ulcer. The pressure upon the bloodvessels, and especially upon the arteries, must come into play here, for, if the movement of the blood in the veins were disturbed more than that in the arteries, hæmorrhages would be found in various portions. The occurrence of hæmorrhages shows, however, that the veins do not entirely escape the pressure of the muscular layer. The great likeness between the symptoms after which, and the place where, ulcer of the stomach appears in both the rabbits experimented on and in man, justifies the conclusion that the genesis of both is the same; and that ulceration and hæmorrhage occurring in men after gastric spasm are the result of arterial anæmia produced by the pressure of the contracting muscular layer of the stomach. When hypersecretion of hydrochloric acid and gastric spasm occur together the conditions are those most fitting for the production of ulcer. The author believes that an excess of hydrochloric acid is often the cause of gastric spasm; but that it is not always the cause is shown by the fact that the administration of large amounts of fluid with carbonate of soda does not always prevent the attacks, and sometimes even seems to increase them. Nor does he claim that every case of ulcer is due to gastric spasm, though very many instances can be explained in no other way. That the ulcers occur almost always in the pyloric region is due to the fact that the muscular contraction is strongest here. When the contraction of the walls of the fundus is unusually strong, ulcers may occur there also.

The condition of the ulcers after once formed is still an undecided question. It has generally been claimed that they showed no tendency to heal, and that they may last for even twenty years or more. The author is, however, inclined to the view that the instances of vomiting of blood after long intervals of freedom from it are simply instances of the formation of new ulcers under the influences of the old causes, the old ulcers having healed. He thinks it improbable, if not impossible, that the functions of the stomach could continue normal between the attacks, if the ulcer were still existing.

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## SURGERY.

UNDER THE CHARGE OF

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### GLUCK'S METHOD OF INSERTING IVORY JOINTS AS A SUBSTITUTE FOR EXCISED ONES.

DR. GLUCK'S claim (*British Medical Journal*, No. 1550) to be able to implant pieces of bone and even whole joints, has naturally excited not only

attention but also much sceptical criticism. We saw, at the recent Berlin Congress, his articulated skeleton with bones patched with ivory and articulations replaced by an ingenious joint of the same material; but it was generally regarded as a curiosity rather than as of practical surgical interest. When a patient was shown, however, with a knee-joint capable of motion through a range of forty-five degrees, more interest was manifested, and Prof. Gluck's explanation of his methods was listened to with marked respect. He uses perforated spindle-shaped plugs of ivory, both ends imbedded in the central portions of the bones which it is proposed to unite. A modification of the method enables him to insert the false joint in suitable cases. There can be no doubt of his ability to secure at least temporary union of the soft parts over these ivory plugs, but the ultimate fate of the latter is more problematical. The possibilities are summed up as follows:

1. They may possibly remain there imbedded in the tissues, and, like pieces of metal, bullets, etc., give rise to no further trouble. Should such be the case with a joint, it is clear that, even if the patient walked well at first, owing to the plugs being sufficiently firmly united to the living bone to permit of it, the joint must after a while wear out, become broken and require to be repaired, thus necessitating a second operation. It is, however, extremely unlikely that any such result would occur. Pathology and practical experience have both taught us that bone or ivory, when it is employed for the union of bony parts, only plays a temporary part in their restoration, and is, after a time, longer or shorter as the case may be, completely absorbed. Gluck's own case, just mentioned, shows how rapidly such absorption can take place; in fourteen weeks after he had completed his operation on the humerus the bone which was extracted was much eroded all over its surface. If a joint is to be inserted which would be capable of performing its functions for any length of time, it must be constructed of metal or of some material which will resist those powers of absorption which are the property of all animal tissues.

2. These introduced pieces of ivory may prove a source of so much irritation that the animal tissues will not erode them, and they will then speedily become loosened from their surroundings and form a sequestrum, which if not removed will only remain as a source of irritation, and will, after some slight injury, give rise to suppuration and make its own exit *nolens volens*. This is practically what would have happened in Gluck's myeloid sarcoma of the humerus case had the ivory plug not been removed by the Professor as soon as it had ceased to be fixed to the surrounding tissues.

3. The irritation of the foreign body will set up an overgrowth of bone in the neighborhood, and thus a joint which is at first movable will, provided much periosteum remains near it, be slowly enveloped in new bone-formation, and have its power of movement gradually checked and eventually brought to a complete standstill by the masses of bone which, advancing from both of the long bones to which it is attached, will at length produce a stiff joint and inclose the ivory apparatus. Complete absorption or necrosis of the ivory joint will then only be a matter of time.

Thus it would seem that surgery can hope for but little aid in this plan of treatment, except in so far as it aids us in promoting the union of bones, or

in preserving temporarily the length of a limb of which considerable portions of bone have been destroyed, thus giving time for the periosteum that remains to supply a new bone equal in dimensions to the one that has been removed.

We shall await with interest the future history of the cases on which Gluck has tried his ingenious plan of bone-implantation, and we shall indeed be surprised if any useful improvement remains three years after the insertion of their ivory joints.

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### The Treatment of Tubercular Arthritis and Abscesses by Iodoform Injections.

Since, according to Bruns (*Arch. für klin. Chirurg.*, Bd. xl. Heft 4), the antitubercular power of iodoform is established beyond all cavil, the treatment of cold abscesses and white swellings by this drug should, when the latter is brought in direct contact with the diseased foci, yield satisfactory results. It is true that the treatment of open ulcers by iodoform applications has been disappointing, but this is readily explained by the fact that the constant secretion washes away the medication. When the diseased granulations are thoroughly removed by curetting or the use of the knife, there are few who will not grant that the free use of iodoform has a very positive and powerful action in preventing recidivity. In cold abscesses the most favorable conditions are offered for the action of an antitubercular medicament. There is here a closed cavity with walls made up of tubercular granulations and encapsulated from the surrounding healthy tissues by a fibrous investment. Iodoform injected into this cavity is brought intimately in relation with all parts of its lining membranes and remains in close contact for weeks. The effects of this treatment are rarely manifested for weeks or even months, then the abscess gradually diminishes in size, and finally disappears entirely. The length of time required to accomplish cure is frequently a cause of failure, since the surgeon, losing faith in this treatment, is prone to abandon it for some other before it has been fairly tried. In large abscesses a decided diminution in size can rarely be expected before one or two months, and complete cure is most exceptional before two to four months. The ultimate result is, however, so well assured that a favorable prognosis can be confidently made even when the patient is compelled to be up and about. In the last five years Bruns has treated upward of a hundred cold abscesses by means of iodoform injection, and 80 per cent. have been cured. This result is in strict accord with the reports of Billroth and Verneuil, and the combined cases are so numerous as to constitute an absolute proof as to the antitubercular power of iodoform. Olive oil was used as an excipient, the drug being added in the proportion of one to ten. Since it has been claimed that recidivity is common after apparent cure by this method, the cases treated two or three years ago were again examined; in all the cure was lasting.

Results such as these would strongly commend the treatment of tubercular empyema in the same manner. The author has had but slight opportunity of testing the treatment; in one case, however, the pleural exudate was in several months diminished one-third, while the body-weight was increased one-fourth.

In the last four years over fifty cases of tubercular joint affections were treated by the iodoform injections. Apparently permanent cures followed in many instances, and Wendelstadt and Krouse report similar results.

For these injections a ten or twenty per cent. mixture of iodoform and olive oil, freshly prepared and sterile, should be employed. This is never followed by sufficient absorption to occasion toxic symptoms. When the disease takes the form of parenchymatous synovitis with marked fungous outgrowth, the injection is carried into the joint cavity and into the fungous masses by means of several punctures, from two to six cubic centimetres of the mixture being forcibly driven in. When there is effusion into the joint, or abscesses have been formed, after puncture and evacuation, a quantity of the mixture sufficient moderately to fill the cavity is injected, from ten to thirty cubic centimetres frequently being required. There is but slight reaction following this treatment, and fixation of the joint is not necessary. Parenchymatous injections are repeated at intervals of eight days; when cavities are treated two to four weeks should elapse between each injection. Pain frequently disappears in a few weeks, but improvement in other respects is a matter of considerable time. The motion of the joint is often completely restored. More than half the cases thus treated may be expected to recover.

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### Intestinal Anastomosis.

T. B. Robinson (*The North American Practitioner*, vol. ii. No. 10, p. 451) describes a new plate for intestinal anastomosis. The only objection to the decalcified perforated bone disks of Senn is the length of time required to make them. He criticises the catgut ring of Abbe and the catgut mat of Davis because they do not coapt enough serous matter; they yield and become macerated; they do not keep the bi-mucous fistula patent; and do not produce sufficient fixation and consequent mechanical and physiological rest to insure healing. The segmented rubber ring of Brokaw is objected to for similar reasons. The plate which the author has used most successfully in a large number of experiments on dogs is a combination of a ring of catgut fastened to a plate made of two pieces of rubber. The two pieces of rubber are stitched together at each end with catgut, and the ring is sutured to the sides of the rubber plate with catgut sutures. The needle-armed sutures of the catgut ring are inserted through holes cut in the rubber plate. A triangular piece is removed from each approximating edge of the segments composing the plate in order to permit of fæcal circulation. The author claims for this plate that it is successful in practical experiments; it is quickly made; it coapts the largest possible serous surface and holds in continuous approximation as long as desired the intestinal walls; it is readily absorbable and easily discharged.

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### A New Intestinal Clamp.

Brokaw (*St. Louis Med. and Surg. Journ.*, vol. lix. No. 4, p. 201) describes a new clamp which he has devised for occluding the lumen of the intestine during operations. He has found the other clamps and devices for this purpose unsatisfactory.

The clamp can be made as follows: A piece of No. 12 copper wire, six or eight inches long, is covered with a piece of drainage tubing by forcing the wire through its lumen. The rubber is left to overlap and its ends are ligated. The rubber-covered wire is now evenly flexed upon itself, until it presents two perfectly parallel blades of equal length, and the completed clamp is ready for use. When the clamp is applied, one blade is pushed through the mesentery within a short distance from the attached surface of the intestine. The ends of the clamp are pressed together sufficiently to compress the gut, and a ligature is thrown around the extremities of the blades. Brokaw has had a similar instrument, with more mechanical finish, constructed by an instrument-maker. The advantages which he claims for his clamp are: simplicity of mechanism and ease of application; uniform compression of the bowel; precise regulation of the amount of compression; readiness with which the parts are separated and sterilized.

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### Gunshot Wound of Important Abdominal Viscera.

J. T. Urie (*Boston Medical and Surgical Journal*, vol. cxxiii., No. 14, p. 318) reports a case of gunshot wound of important abdominal viscera with recovery. The patient was a soldier who was shot at rifle-practice. A 45-calibre conical rifle-ball entered the body about two inches to the right of the spine of the twelfth dorsal vertebra, and made its exit in the right hypochondrium, four and three-quarters inches from the median line, and passing in an oblique course between the ninth and tenth ribs. The injury was followed by great pain, but little or no evidence of shock.

No operation or exploration—beyond a futile attempt at probing—was attempted; the expectant plan of treatment being adopted.

There was hæmaturia for nine days after the receipt of the injury; and jaundice appeared between the fourth and fifth days. There was not at any time much abdominal tenderness beyond the site of the wound. There does not appear to have been any general peritonitis.

On the twenty-third day of the illness the patient was seized with a severe attack of pain, referred at first to the epigastrium, and later to the back. Nausea and vomiting followed, and about one pint of partially-changed blood was ejected from the stomach.

The patient ultimately made a perfect recovery. The liver and kidney were undoubtedly wounded in this case. The treatment consisted of morphine and stimulants.

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### Diverticulum of the Male Urethra.

Dittel (*Wien. klin. Wochenschrift*, 3 Jharg., No 32) reports an instance of this rare anomaly, so rare that Kaufmann was able to collect but eight cases after a careful study of the literature of the subject. In the reported instance the diverticulum was not discovered till the patient had passed middle life; then a tight stricture was followed by the development of a fluctuating tumor the size of a child's fist located on the under surface of the penis. Concentric pressure on this tumor caused the escape of foul, purulent urine from the meatus. In addition, when the patient entered the hospital, the ordi-

nary signs of urinary infiltration were found. Three incisions were made, and the tumor before discovered was found to be a sac lined with mucous membrane, and communicating with the urethra by a comparatively small opening. Microscopic examination showed that this cavity was not a retention-cyst, while the microscopic appearances entirely precluded the possibility of its being an exaggeration of the dilatation commonly observed behind strictures. The fistula resulting from the incision was closed by a repeated plastic operation. Nearly all the cases observed have been found in the persons of young patients, the abnormality probably depending upon the fact that the peripheral and central parts of the urethra have, in their fœtal development, not united before urine is forced into the central part.

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### Ligation of the Vertebral Artery for Epilepsy.

The notes of a case of epilepsy in which the vertebral artery was tied are communicated by Telford Smith (*The Journal of Mental Science*, vol. clv., New Series, No. 119, p. 518).

The patient was a congenital imbecile, eleven years old, who had from twenty to thirty fits per month. In 1881 the left vertebral artery was tied by Dr. Wm. Alexander. The operation was followed by arrest of the epilepsy and marked mental improvement under training. This improvement lasted four years, after which the fits returned, and his mental state steadily deteriorated; until in 1890 he became a hopeless epileptic idiot.

Ligature of the vertebral arteries for epilepsy has been performed by Dr. Alexander with the expectation that the diminution of the blood-supply to the brain and spinal cord would be more permanent than after ligation of other vessels, on account of the absence of anastomosing branches, and the restraints to dilatation of the unligatured vessels by the bony canals through which the cerebral vessels pass. On account of the uncertainty of cure, however, Dr. Alexander has ceased to perform this operation.

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### A Case of Perforating Gunshot Wound of the Chest and of the Wrist-joint.

The results of antiseptic surgery as applied in military practice are well shown in the case reported by Thomson (*Indian Medical Gazette*, vol. xxv., No. 9). The patient was wounded by balls fired from a carbine at short range. One bullet entered the chest on the left side, at the level of the ninth rib below the angle of the scapula, and made its exit one inch below the left clavicle, and three inches from the left clavicular notch. Beyond shock and slight dyspnœa, traumatopnœa was the only sign of lung wound present. The second ball traversed the left wrist-joint. Both wounds were carefully washed with 1 : 5000 perchloride of mercury solution, were syringed with one per cent. tincture of iodine lotion, and, after the removal of all foreign bodies, were dressed antiseptically. Beyond dulness and bronchial breathing noticeable for a few days over the middle portion of the left lung in front and behind, recovery, in so far as the chest-wound was concerned, was uninterrupted. At no time was there any hæmoptysis, or even a tinge of blood in the sputum. There was sloughing in the wrist-wound, which finally healed by granula-

tion and cicatrization. Six months later the patient returned to duty able-bodied in every way, and with good motion of the wrist-joint.

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### The Ultimate Results of the Treatment of Goitre by Ligature of the Thyroid Arteries.

The histories of twenty-one cases of goitre treated by ligature of the thyroid arteries, together with deductions drawn from personal experience and a careful study of the literature of the subject, are communicated by Rydygier (*Archiv für klin. Chirur.*, Bd. xl., Hft. 4). The majority of these cases were operated on in 1887 and 1888, so that sufficient time has elapsed to speak with some authority upon the final results. In all except the first case the two inferior and the two superior arteries were tied at one sitting, two ligatures being applied to each vessel, and the latter being divided between these threads. The fear, at one time entertained, that gangrene might follow this interference with the blood-supply of the thyroid, has been abundantly proved to be groundless, the crico-thyroid arteries and the vessels of the œsophagus providing a sufficient supply to maintain the vitality of the part. The fear has also been entertained that ligation of all the arteries would be followed by the same systemic changes observed after total extirpation of the thyroid; as a matter of clinical fact, this result has not been observed, nor should it be expected, since it is found that the gland never disappears entirely. Simultaneous ligation of the four thyroid arteries is, however, not to be recommended in all cases. Thus in the fibrous goitre, this method is necessarily abortive, for cure is effected by the replacement of the parenchyma of the enlarged gland by fibrous tissue, which, in the course of its cicatricial contraction brings about disappearance of the enlargement; hence, when the tumor already consists of cicatricial tissue, cutting off of the blood-supply can be of little service. Also in the case of cystic goitre no good effect can be hoped from ligation of the arteries; indeed, when this method of treatment is adopted in struma gelatinica, it seems at times to favor the development of cysts.

In colloid goitre a treatment by ligature is followed by distinct alleviation of the subjective symptoms. Tumors of great size are diminished only slightly, smaller tumors show much more marked improvement. This is probably because in recent cases, where the enlargement is not great, there is a large amount of unaltered gland tissue remaining It is the disappearance of this which occasions the diminution in the size of the growth.

The best results follow this treatment when it is applied to moderately large, recent, parenchymatous goitres, where the glandular structure is little altered; these rapidly diminish in size after ligature of the supplying vessels, especially where the tumor is markedly vascular, and frequently the neck becomes entirely normal in appearance.

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### Two Cases of Recurring Carcinoma of the Genitalia.

Herzfeld (*Wien. klin. Woch.*, 3 Jahr., No. 32) holds that total extirpation of the uterus, either by abdominal incision or through the vagina, is not indicated in cases of carcinoma of the vaginal portion of the cervix uteri,

since other means, such as amputation, curetting, and the use of caustics or the actual cautery, give practically as favorable a prognosis and are not attended by as great danger to the life of the patient. It is well known that lasting cures have followed each of these milder methods of treatment; thus the author mentions having seen a case which had remained free from return of disease for twenty-nine years after amputation of the cervix for carcinoma. Two cases are reported in full. In the first, on account of cancer of the vaginal portion of the cervix, amputation by means of the galvano-cautery was practised in 1879. In 1889 the patient returned with a slight carcinomatous development about the meatus urinarius; the site of the former operation remained entirely healthy. The second case was operated upon, in 1884, for epithelioma involving the clitoris; the thermo-cautery was used. Five years later a small epitheliomatous nodule began to develop upon the right labium majus. This also was excised.

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## OTOLOGY.

UNDER THE CHARGE OF

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### "Unrecognized Lesions of the Labyrinth."

Such is the title of the Cavendish Lecture, delivered before the West London Medico-Chirurgical Society, June 6, 1890, by Dr. Alexander Ogston, of the University of Aberdeen (*The Medical Press*, June 18, 1890). Effusion into the labyrinth is first considered. Reference is here made to certain affections of the labyrinth, presenting symptoms somewhat similar to Ménière's disease, but of a different character and less striking in their features, and "possibly nearly always overlooked or misinterpreted." Among elderly or gouty subjects known to possess gouty or chronic rheumatic tendencies, or in those in whom it is fair to suppose that such conditions exist, there may be found attacks of what are termed "serous effusion into the labyrinth, with increased intra-labyrinthine pressure, a process analogous to glaucoma of the eyeball." The patient observes "that some morning, without any observable cause, he suffers from the feeling of tension in his ear." This sensation of distention and discomfort usually rapidly increases during the first six or eight hours, and is attended with great distress and anxiety. It will also be found that the patient is deaf in the affected ear, and has tinnitus. It will be found that the hearing for a watch normally audible at twenty-five feet is now audible only two feet. The voice is relatively better heard.

"This deafness gives rise to a singular phenomenon in the region of the external auditory meatus. When, in a normal ear, the finger is brought in contact with the skin around the meatus, the individual both feels and hears

the contact. If the deafness described is present, the contact of the finger is felt as usual, but is not so distinctly heard, and hence, for three-quarters of an inch in front of and below the meatus, and over nearly the whole pinna, when the finger is rubbed gently so as to stir the fine hairs and the skin, the patient feels as if the part touched were benumbed in marked contrast to the sound ear, where the usual familiar sensation is perceived." However, as the author states, this phenomenon is observed "in any condition of the ear which interferes with the conduction of sound to the internal ear." It cannot, therefore, be accepted as pathognomonic of effusion into the labyrinth.

Then follows a description of the various forms of tinnitus aurium and hyperæsthesia of the hearing-sense observed in the cases named above in the title, but which correspond exactly with the phenomena observed in every case of acute catarrhal congestion or inflammation of the middle ear. It is not accurate nor tenable, therefore, to classify such cases as simply "effusion into the labyrinth." Were there the latter condition the deafness must be profounder and permanent.

The author holds that the drum-cavity becomes affected secondarily, the disease "probably passing outward through the *fenestra ovalis* and the *fenestra rotunda*," a state of things not ever seen in this country, so far as the knowledge and experience of your reporter go.

The "variable severity" of the attacks corresponds entirely and exactly with the forms of acute catarrhal swelling and inflammation in the tympanic cavity, varying from the severe and distressing, to those that attract very little attention.

Then the course of the disease, as described, is exactly that of progressive, catarrhal deafness; very well described, but attributed to wrong causes. In many cases there is a loss of balancing power, just as there is in cases of so-called chronic catarrh of the middle ear. There is said to be a permanent deafness to shrill faint sounds from the first attack. There is nothing offered by the author to elucidate the pathology of the disease to which he has given a new name, because no cases have died of it, and hence he has made no dissections. We recognize all the way through the article a familiar foe with only a new name. Effusion of the labyrinth may occur secondarily in cases of tympanic inflammation, but the latter condition is the frequent and primary one.

The treatment found most efficacious by the author is, first, rest in bed, and then protection of the ear from loud sounds. As the patient gets better he may walk about, but avoid all severe exercise and fatigue, and also loud sounds and noise.

The author also claims "that the field of hearing of a normal ear has its limits in lateral directions, and that points of greater or less acuteness exist in it. If a person be seated with his ear horizontally directed toward a watch or other source of sound, and at such a distance from it that he can just distinctly perceive it, it will be found that as he inclines his head in various directions, the sound becomes more or less distinct, and at certain limits of inclination inaudible."

### Treatment of Sclerotic Disease of the Middle Ear.

In an article on the above-named topic Dr. Löwenberg, of Paris, records the following observation made by him in the inflation of fumes of bromethyl into the middle ear for the relief of tinnitus (*Deutsche med. Wochenschrift*, July 10, 1890). After stating that this drug has rendered the tinnitus less in many cases, he states that "if the vapors of ether, chloroform, or bromethyl be inflated into the middle ears of those not suffering from sclerosis of the middle ear, a sensation of coldness in the ear is felt, whereas the same vapors inflated into the ear of one affected with sclerosis of the drum-cavity produce a sense of heat." This may be considered a valuable aid in differential diagnosis and in prognosis.

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### A Contribution to the Study of Intracranial Complications of Chronic Otitis Media.

An interesting and valuable article with this title has been contributed by R. Glasgow Patteson, M.D., etc., Surgeon to St. Vincent's Hospital, Dublin, in the *Dublin Journal of Medical Science*, July 1, 1890.

The case forming the subject of the paper was one of chronic middle-ear disease in a woman nineteen years old, who had suffered from otorrhœa in her left ear since she was three years old, when she had measles. Since that time the ear had been affected with discharge and deafness. Gradually the patient grew deafer, and at last suffered great pain in the left ear and side of the head, and showed dulness of intellect.

The symptoms became such as finally to demand trephining the mastoid. "The opening was made half an inch behind, and its lower border on a level with the lower edge of the external auditory meatus, but in trephining," says the writer, "I did not allow sufficiently for the small skull I had to deal with, nor did I direct the trephine sufficiently upward, and instead of opening the mastoid antrum I exposed the dura mater, as subsequent events showed, just behind the genu of the lateral sinus. No softening of the bone was found at this point, and the dura mater was perfectly healthy."

Thrombosis of the lateral sinus finally ensued and an extra-dural abscess with pyæmia. Then a secondary trephining and exploration of the temporal lobe of the brain were instituted, followed by death from embolic pneumonia.

It is worthy of note that in the evening following the operation the patient complained of a throbbing in the left side of the head, and of stiffness *and pain in the neck*, in the line of the sterno-cleido-mastoid muscle, much increased by the slightest effort of moving or even on being turned gently in bed. There was also an intense craving for food, great peevishness and irritability of temper. As Mr. Patteson says, this soreness and stiffness in the neck marked the extension of a septic thrombosis into the internal jugular vein. Coincident with this extension was the development of a short, troublesome cough, unaccompanied by expectoration, which began four days before the patient's death. This was due to the development of embolic pneumonia, "the commonest cause of death in thrombosis of the lateral sinus."

The variability in the course of the lateral sinus produced a complication in this case, as it wound forward and outward, as is the case in brachycephalic

skulls,[1] a point apparently unknown to the operator in this case. In the brachycephalic, the middle fossa of the skull is lower or deeper than in the dolichocephalic. In this instance disease of the lateral sinus was found associated with cerebral abscess and not with cerebellar abscess, as is generally the case.

There are many symptoms common to the initial stages of all varieties of complication to which subjects of old-standing disease of the middle ear are liable, "such as increased pain in the ear, tenderness over the mastoid process or along the sterno-mastoid muscle, general irritability and peevishness, foul tongue, associated with persistent nausea and vomiting, headache, which may be either frontal, parietal, or occipital, independent of the seat of the disease, occasionally diarrhœa, and a rise of temperature, which may be associated with rigors, and is perhaps the most frequent of all; these symptoms collectively, or any combination of them, may be present, thus affording but little aid to a differential diagnosis," as they all indicate "an acute, septic infection grafted on an ordinary saprogenic suppuration" (Barker), and are accordingly common to all. Among the symptoms usually regarded as being closely connected with intra-cranial lesions, *optic neuritis* is first named, but has been found entirely unreliable as a diagnostic guide. Much reliance cannot be placed upon *vomiting* as a symptom of differential value. Mr. Barker has called attention to "slow and sluggish cerebration" as a symptom of either cerebellar abscess or collections of pus in the temporo-sphenoidal lobe, while it is not a symptom of other complications of disease of the temporal bone.

The author then remarks that "in all cases of brain-abscess, no matter what their seat, the respiration is slow and shallow, but *regular*. If, however, a secondary basal meningitis has occurred, most markedly when the posterior fossa of the skull is affected, the slowness is associated with *irregularity* of breathing, and in several cases Cheyne-Stokes respiration has been noticed." But "the most reliable guide, in the majority of cases, seems to be the course of the *temperature*, and the association of repeated rigors with marked oscillations of temperature would appear to be the most constant symptom of sinus thrombosis."

Mr. A. E. Barker's types for each class of cases are then quoted as follows:

*Pyæmia.* The temperature lines are of extreme irregularity and the oscillations frequent.

*Meningitis.* The temperature lines are not so irregular as in pyæmia, but often higher.

*Cerebral abscess.* The temperature lines are unusually low, often subnormal, and do not show much oscillation. "In the majority of cases, however, we must depend upon the history of the case, the seat of the origin of the disease, and the steps of its progress, to enable us to arrive at any conclusion approaching definiteness; while in a very large proportion of cases nothing but an exploratory operation affords a chance of making a diagnosis or of saving the patient's life."

In speaking of treatment Mr. Patteson is of the deliberate opinion expressed "without fear of contradiction, that every case of otitis media which

[1] Körner: Archives of Otology, vol. xvi. p. 281, Dec. 1887.

has not yielded to treatment by antiseptic injections, insufflations, etc., within a year from its beginning, should be treated by free opening of the mastoid antrum and the establishment thereby of thorough means of irrigation and drainage; and if that should not prove sufficient, by exposure of the dura mater both above the tympanum and in the neighborhood of the lateral sinus."

Treatment of thrombosis of the lateral sinus "by ligation of the internal jugular vein in the middle third of the neck so as to cut off from the general system the focus of septic dissemination," has been suggested by Mr. Victor Horsley. This form of treatment has been *successfully* carried out by Mr. Lane in Guy's Hospital, August, 1888, in a boy ten years old.

Mr. Ballance reported four cases in which the lateral sinus had been explored for septic thrombosis, and the jugular vein ligatured (Med. Soc. of London, March 31, 1890). The vein was divided between the two ligatures, and after as much of the clot as possible was removed, the upper part of the divided jugular was washed out from its distal extremity with an antiseptic solution. Two of the cases recovered.

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## DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

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### Hamamelis and Alcohol in the Treatment of Nasal Polypi.

In an article on the Treatment for the Radical Cure of Polypi of the Nose (*Med. Record*, June 18, 1890) Dr. E. Harrison Griffin recommends spraying the nose night and morning with sprays of witch hazel or of alcohol, at first dilute and gradually increased to full strength, for at least one year after thorough removal of the polyps with the wire snare. He reports a number of illustrative instances, in one of which he removed fully three hundred polypi at various sittings, and in another more than one hundred in the course of a week. Caustics and cautery after extirpation he finds to be almost invariably followed by renewed growths.

### Nasal Polypi.

Dr. Walker Downie, of Glasgow, recently exhibited (*Brit. Med. Journ.*, September 13, 1890) several unusually large nasal polypi, three of which, from different individuals, were respectively two and one-half, two and three-quarters, and three and one-quarter inches in length. Another, which had occupied the post-nasal space, weighed a few grains short of half an ounce.

All had been removed with long-bladed lock-jointed forceps after cocainization. When closed upon the growth the forceps were left in position for two or three minutes, so as to crush the bloodvessels. Then, with a half or two-third rotation of the forceps the mass readily came away.

In the same number of the *Journal*, in an editorial on Nursing in the London Hospital, allusion is made to a death in the medical staff last year, and another in the nursing staff this year, from suppurative meningitis following the removal of polypus from the nose.

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### Medicated Nasal Cylinders in the Treatment of Hay-fever, Catarrh, Ozæna, Nasal Diphtheria, etc.

Dr. Scanes Spicer, of London, uses (*Brit. Med. Journ.*, September 13, 1890) hollow glyco-gelatine cylinders variously medicated, which are inserted in hollow, oval vulcanite plugs. Each plug is provided for safety with a string anteriorly, which can be attached to a fellow plug when two are used, one in each passage. The process of liquefaction requires several hours, during which time the rhino-pharyngeal tract is continuously subjected to the action of the drug, and is soothed and moistened by the glyco-gelatine; and this without suspending nasal respiration. They are likewise used with advantage after operations in the nose, in post-nasal catarrh, and in whooping-cough.

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### On Nasal Obstruction and Mouth-breathing as Factors in the Etiology of Caries of the Teeth and in the Development of the Vault of the Palate.

This is a reprint of an address before the Odontological Society of Great Britain by Scanes Spicer. It is contended that obstructions to respiration by the nose and subsequent mouth-breathing lead to arest in the growth of the vomer and the sinuses of the sphenoid bone; thus producing the highly-arched or vaulted palate, and lateral flattening of the upper jaw. The accumulations of organic matters in the irregularities of the teeth, unremoved by motions of the tongue, lips, and cheeks, and by the action of the saliva, produce the caries so frequently found in association with nasal obstructions. Hence, a plea for the simultaneous services of the rhinologist and the dentist.

Rhinologists generally are more apt to view the obstructions of the nasal passages, especially the deformities of the septum, as the result of deformations of the palate and maxillary bone and not as the cause. The arching of the palate, the anterior projection and lateral compression of the upper jaw-bone are usually, and we believe in most instances, correctly attributable to the habit of thumbsucking. Arrest of development of the septum will hardly account for deflections and exuberant spurs, which are rather indicative of supernutrition.

Spicer states that his hypothesis was suggested by the observations of John Hilton as to the part played by the vomer and the sphenoidal sinuses in the formation and position of the hard palate (*Developmental and Functional Relations of Certain Portions of the Cranium*, 1855).

### Deformities after Abscess of the Septum Narium, and after Fractures of the Nose.

In an article on abscess of the septum narium Dr. Gouguenheim, of Paris (*Annales des Mal. de l'Or. du Lar.*, etc., September, 1890), reports three personal observations of this rare affection, two in a child, and the other one in an adult. In two of these there occurred a deformation of the nose just below the osseous framework, which, in one instance, occurred before the abscess was opened, and remained permanent. This deformity is theoretically accounted for in the probability that the abscess involved the posterior portion of the cartilaginous septum and produced a luxation backward from the perpendicular plate of the ethmoid or from the vomer. This opinion is based upon some experiments on the cadaver made by the late Dr. Daniel Mollière at Gouguenheim's suggestion, to test his theory of similar deformation in perforating ulcers from syphilis which, when seated in the anterior portion of the cartilaginous septum, do not produce this deformity. In consequence of his observation *post-mortem* in cases of fractures of the nose as well as from experiments on the cadaver, Mollière reached the conclusion that fracture of the nose is a luxation of the septum upon the vomer.

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### Deflections of the Septum Narium.

In a recent discussion of this subject in the British Medical Association (*Brit. Med. Journ.*, September 13, 1890), the following points may be noted as of interest. Dr. E. Woakes, of London, who opened the subject, declared that in deviations and spurs of idiopathic origin, the cause would most frequently be found in the presence of enlargements of the spongy bone, whether due to hypertrophy, to neoplasms, to exostoses, or to cysts. In operations for removal of spurs, he had found that Rouge's exposure by detachment and eversion of the lips afforded very little additional room for interference. He removed the spur with a saw, and covered the wound with a small plug of wool dipped in carbolized vaseline, and sometimes dusted with iodoform. Any deviation requiring correction was rectified with an Adam's dilator, and the new position was maintained with two plugs made of firwood wool instead of some solid material, and which could be kept in position for a week.

Mr. W. J. Walsham, of London, preferred shaving off exuberant portions of the deflected septum. When there was deviation of the maxillary crest, he fractured the crest and forced the upper fragment along with the attached cartilage into the median line and retained it there with suitable appliances until consolidation had taken place. In cases of general deviation of the whole septum to one side in conjunction with irregular spurs and localized bulgings, and combined with deflections of both the vomer and the maxillary crest, forcible straightening with excision of the most prominent spurs offered the best prospect of success. If this failed, the best course was to remove the inferior turbinated body and leave the septum alone. When the nasal bones were depressed so that the nose became broad, and the nasal processes of the maxillary bones separated, the bones could in many cases be lifted or wrenched into place with forceps. No untoward results, such as necrosis or other injury, had hitherto occurred in his practice, though if too

much force were used it might be possible to injure the cribriform plate of the ethmoid, and thus run the risk of septic meningitis.

Dr. J. H. Bosworth, of New York, believes that deflections and spurs of the septum are responsible for the large majority of diseases of the nasal mucous membrane. He employs the saw to remove the spurs, not simply for the purpose of curing the stenosis, but in order that the turbinal bodies may perform their important normal functions. He considers that anything which interferes with the respiratory duty of the nose is likely to be followed by disease in other portions of the respiratory tract; and that therein is the origin of most diseases of the larynx, trachea, bronchi, and even the lungs. The restoration to healthy action of the turbinated bodies, and their intact conservation, are, therefore, of primary importance.

Dr. William Hill pointed out that the spurs ordinarily met with were only exaggerations of slight prominences normally existing along the vomeric sutures.

Mr. Lennox Browne explained that these slight septal thickenings were capable of becoming hypertrophied as the result of inflammation.

Dr. Greville Macdonald emphasized the fact that a large proportion of individuals suffered from these and similar forms of nasal obstruction with absolute impunity. He urged the impossibility of straightening a deflected septum, seeing that it lay between fixed limits; he advocated the perforation of the convexity in preference to any crushing.

Dr. Scanes Spicer suggested injury to the cartilaginous structures during parturition as a cause of slight displacements made evident later in life by palpable deflections.

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### Reflex Spasm of the Œsophagus.

Joal, of Mont-Dore, reports (*Rev. de Lar. d'Otologie et de Rhin.*, August 15, 1890) a case of œsophageal spasm, due to hypertrophy of the so-called fourth tonsil, a mass of lymphoid hypertrophy in the base of the tongue. Last year he reported nine cases due to nasal and genital disorders.

[We have seen œsophagismus result from various pharyngeal diseases, especially chronic folliculous tonsillitis with accumulations of masses in the crypts; and likewise from aural irritation, due to accumulations of cerumen in the external auditory meatus. It is important that these facts be borne in mind in cases of recurrent œsophagismus and even in some cases of continuous stricture.—Ed.]

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### Intubation Without the Gag or the Extractor.

Guido Bell, of Indianapolis, finds (*Journ. Amer. Med. Association*, August 30, 1890) the gag and the extractor both superfluous in introducing and in withdrawing the tube. He simply passes his left index finger behind the root of the tongue, and then the larynx at once rises in the effort of gagging and meets the awaiting finger. At this moment he inserts the tube with the right hand, retains it in place with the left hand, and withdraws the introductor at once. In more than one hundred intubations after this method, he has not occupied more than three seconds. Dr. Bell states that there is no biting for a few seconds after the finger has been thrust into the

larynx; but that the finger had best be protected in front of the knuckle by a shield of adhesive plaster.

To withdraw the tube, he simply squeezes it up into the pharynx by grasping the larynx externally; and he hooks it from the mouth with his finger; thus discarding the extractor altogether. He has succeeded in removing the tube in this manner in five cases in which removal with the extractor had repeatedly failed.

### Quinsy at Eight Months of Age.

Lewis H. Taylor, of Wilkesbarre, reports (*University Med. Magazine*, August, 1890) an instance of acute tonsillitis in a female infant eight months of age, in which, after prolonged suffering and threatened asphyxia, immediate relief was secured by incision, giving egress to fully an ounce of fetid pus, which gushed out to a distance of nearly two feet.

### Sodium Bisulphite in Epidemic Tonsillitis and Coryza.

C. M. Fenn, of San Diego, testifies (*University Med. Magazine*, August, 1890) to the prompt effect of this drug in aborting many cases of tonsillitis and coryza. He prescribes a saturated solution, and prefers the English preparation. He gives tablespoonful doses every hour or two for twelve hours, and then every three or four hours for twelve or twenty-four hours longer. He seldom finds it necessary to continue the remedy beyond forty-eight hours.

## OBSTETRICS.

UNDER THE CHARGE OF

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### Cæsarean and Porro Operations.

Stolipinsky (*Centralblatt für Gynäkologie*, No. 35, 1890), from experiments upon animals, concludes that compression by the rubber tube is the best method of preventing hæmorrhage; it should be applied as soon as the abdomen is opened, but should not be tightened until the uterus is empty. Martin's elastic bandage is a convenient form of compressor. The atony of the uterus often observed after the use of the compressor is caused by the fact that the uterus is empty of blood. Observations prove that the Cæsarean operation, including the use of the compressor ligature, is entirely harmless for the fœtus. The percentage of living children delivered without asphyxia when the compressor was applied after the delivery of the child or placenta

is considerably greater than when the compressor was applied while the child was still in the uterus.

McGowan (*Lancet*, p. 1423, 1890) reports a case of osteo-malacia in which excessive pelvic deformity resulted. She had previously borne five children, and her pelvic deformity had developed in the six months preceding the time of operation. The patient had been forty-two hours in labor when first seen. She survived the usual Cæsarean section six days, dying from exhaustion and peritonitis.

Dudley (*American Journal of Obstetrics*, p. 712, 1890) reports a Cæsarean section in a dwarf, in which catgut was used to close the uterus and abdomen. The endometrium and an eighth of an inch of uterine tissue were included in an over-and-over stitch. A second row of similar sutures included the muscular wall, and a third row closed the upper muscular tissue and peritoneum. The time of the operation was one hour and twenty minutes. Hæmorrhage was controlled by the elastic ligature, the case resulting in uncomplicated recovery.

Adam (*Australian Medical Journal*, No. 7, p. 300, 1890) reports a Porro operation in an imbecile dwarf with highly-contracted pelvis. It was necessary to turn the uterus completely out of the abdomen before the rubber ligature could be passed about the cervix. Uterine amputation was performed with the use of Tait's wire clamp. In addition, a couple of pins were passed through the stump, which was treated with perchloride of iron, and dressed with iodoform. Mother and child made satisfactory recovery.

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### The Relation Between Ovulation and Menstruation.

Cohnstein (*Deutsche Medicinische Wochenschrift*, No. 34, 1890) concludes that a relation of time and also cause and effect exists between these two phenomena. The cessation of ovulation is followed by the cessation of menstruation. Ovulation, however, may go on independently of menstruation, and the functional activity of the ovary may be estimated by its response to reflex stimulus. The ovaries probably alternate in their function. It is impossible to estimate definitely the age of any Graaffian follicle.

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### The Treatment of Abnormal Insertion of the Placenta.

Pinard (*L'Union Médicale*, No. 78, 1890) would treat abnormal insertion of the placenta by external version, performing cephalic version when the placenta is laterally inserted, and podalic version when it is central. For hæmorrhage he would rupture the membranes.

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### A Study of the Blood in Pregnancy and the Puerperal State with Reference to the Amount of Hæmoglobin.

Dudner (*Münchener medicinische Wochenschrift*, Nos. 31 and 32, 1890) states that during pregnancy the percentage of hæmoglobin and corpuscles diminishes, but increases again under favorable conditions of life. Soon after delivery, hæmoglobin and corpuscles are lessened in proportion with the anæmia of the patient. In the majority of cases, in eight days after labor

the percentage is increased to that of pregnancy. During active labor the percentage is lessened by cutaneous transpiration.

### The Pathology of the Newborn.

Chipault (*Bulletins de la Société Anatomique de Paris*, 1890, p. 280) reports the case of a child dying two and one-half months after birth, whose mother suffered from puerperal infection. The child complained of multiple arthritis during life. Post-mortem examination revealed the right elbow and hip-joints extensively decomposed by osteomyelitis. Streptococci were found in abundance in many of the joints of the body. It seems a reasonable inference that the child became infected from the mother's puerperal sepsis.

Valenta (*Wiener klinische Wochenschrift*, No. 35, 1890) regards aseptic prophylaxis as quite sufficient, in the majority of cases, to prevent ophthalmia neonatorum. Credé's treatment by nitrate of silver is too dangerous to be placed in the hands of nurses.

Partridge (*New York Medical Record*, 1890, p. 210) reports an interesting case of multiple oozing of blood with excessive jaundice in a newborn child. Recovery ensued. In his observation in 1166 infants born at the Nursery and Child's Hospital, New York, 11 cases of hæmorrhage have occurred with a mortality of 75 per cent. At the Sloane Maternity Hospital, in 850 infants there have been 14 cases, mortality over 60 per cent. No intelligent family history of bleeding was obtained.

### Labor Complicated by Uterine Fibro-myoma.

Cameron (*Montreal Medical Journal*, p. 91, 1890) reports a case of interstitial fibroid complicating pregnancy, in which, fifty hours after the beginning of labor, a dead child was spontaneously born. The head was very much compressed. After labor, the patient was seized with septic trouble apparently arising from the tumor, and laparotomy was performed, but the patient succumbed. Examination of the amputated uterus showed marked fatty degeneration without endometritis. The tumor contained multiple cavities filled with opaque fluid. No evidences of suppuration were found.

Dolléris (*Journal de Médecine de Paris*, No. 37, 1890) reports a case of uterine fibroid upon the right side of the uterus, in which the patient had borne three living children without difficulty. The tumor and the uterine appendages were finally removed by operation, the patient making a good recovery. He also describes a case of tubal pregnancy complicated by uterine fibroid, in which abdominal section was done for sudden pain and syncope occurring early in pregnancy. At the operation, ruptured tubal pregnancy with uterine fibroid was found. The removal of the tumor and the appendages was followed by complete recovery.

### Ectopic Gestation.

Landau (*Berliner klinische Wochenschrift*, No. 35, 1890) reports a case of pregnancy in a rudimentary uterine cornu in which abdominal section was performed. The uterus was found smaller than is usual, and an examination of the tumor, which was removed with the appendage of that side, disclosed

a body shaped like the uterine body, with muscular walls, containing bloody fluid, and an adherent clot. The tumor connected with a muscular impervious cord covered with peritoneum. On the left side of the tumor, the left ovary, tube, and broad ligament were found as normal. On the right side adhesions existed. The corpus luteum of pregnancy was found in the right tube. It is probable that not only was rudimentary pregnancy present in this case, but also migration of the ovum had occurred.

HAHN (*Berliner klinische Wochenschrift*, No. 30, 1890) removed a tubal pregnancy of six weeks. The usual symptoms, pain, hæmorrhage, and shock, indicated operation. The removal of the tumor and tube from the right side of the uterus caused immediate cessation of the symptoms.

## GYNECOLOGY.

UNDER THE CHARGE OF

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OF NEW YORK.

### ALEXANDER'S OPERATION.

ALLOWAY (*Montreal Medical Journal*, April, 1890) reports twenty cases of this operation, the results of which had been most satisfactory. He believes that the operation is incomplete if any existing injury of the pelvic floor is not repaired at the same time; indeed, he advises the performance of trachelorrhaphy, perineorrhaphy, and shortening of the round ligaments at one sitting when the uterus is large and subinvoluted. He aptly remarks that "to suspend a heavy, bulky uterus by the aid of the round ligaments over a prolapsed pelvic floor is unreasonable, and the bad result obtained will only tend to bring the round-ligament operation into discredit, and very unjustly so."

In regard to certain points in the technique of the operation, he differs from Polk, since he aims at securing healing of the inguinal wounds by first intention, using a special form of drainage-tube. The patient is caused to wear a double truss for a few months after the operation.

### THE DIAGNOSIS OF SALPINGO-OÖPHORITIS.

MICHNOW (*Centralblatt für Gynäkologie*, No. 32, 1890) calls attention to the importance of obtaining some characteristic sign of this condition, in view of the frequent difficulty in diagnosis. Lebedeff has observed that after repeated examinations of patients with suspected tubal disease, he was able to demonstrate at one examination a well-marked enlargement of the tube upon one side, while at a subsequent one nothing could be felt but an ill-defined cord or induration; on palpating the same patient after an interval he would find that the condition was reversed, the distended tube having

collapsed so as to form a band or cord, while at the site of the induration on the opposite side there was an enlarged tube. It was found that at the beginning of menstruation the distended tube became larger, that toward the end of the period it diminished in size, and became completely collapsed after the cessation of the flow. The opposite tube may remain unchanged, or may gradually increase in size in inverse order. This increase in size is to be explained not only by the general periodical congestion of the pelvic organs, but also by the fact that the mucosa of the tube becomes swollen at this time, and a certain amount of blood may escape into its interior; moreover, there may be a fresh secretion of fluid into the tube. When a diseased ovary forms part of the tumor, the enlargement of Graafian vesicles, which still remain healthy, doubtless accounts for a certain amount of increase in its size during menstruation. This phenomenon is more clearly marked when the original tumor is of moderate size.

By carefully observing successive cases in which the pressure of salpingo-oöphoritis was doubtful, Lebedeff was able to arrive at a positive diagnosis, which was in each instance confirmed by laparotomy.

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### Tuberculous Ulceration of the Portio Vaginalis.

Haidenthaller (*Wiener klin. Wochenschrift*, No. 34, 1890) describes and figures a case of this rare affection, which possessed more than usual interest, since in all the other cases that have been reported the tubercles were of the miliary variety. The patient was twenty-nine years of age, and had borne three children, one of whom had died of tuberculosis of the intestines. Her father died of phthisis, and she had had a "catarrh" for several years. Three years and a half before coming under observation she had aborted at the second month, and suffered from metrorrhagia for eight months after, the hæmorrhage ceasing after curetting. Two months later she began to have a sanguineous discharge, which later became purulent and foul-smelling. She emaciated rapidly, and complained of pains in the abdomen with cramps in the lower limbs. On examination well-marked evidences of pulmonary trouble were found; the abdomen was tympanitic and so tender that thorough palpation was impossible. The urine, as well as the sputum, contained tubercle bacilli. Vaginal examination showed that the uterus was small, retroflexed and adherent, while the left tube was enlarged to the size of the little finger. On the anterior lip of the cervix there was a superficial ulcer as large as a quarter of a dollar. A diagnosis was made of tuberculosis of the lungs, tube, corpus and cervix uteri, with probable tuberculous disease of the intestines. At the autopsy this was entirely confirmed; the entire endometrium was studded with cheesy nodules, as well as the kidneys, ureters, and bladder. It is probable that the primary infection in the genital tract was situated in the tube, and that the lacerated and eroded cervix became infected through the discharge from the interior of the uterus, which began after the abortion. There was a possibility that infection had been introduced by the curette.

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### Hæmatoma of the Ovary.

Doran (*Trans. London Obstetrical Society*, vol. xxxii., 1890) met with the following case of apoplexy of the ovary without rupture: The patient was

admitted to the Samaritan Hospital six months after a sudden attack of pain in the right side of the abdomen. Soon after this attack an abdominal tumor was observed, round, elastic, and freely movable. When examined previous to the operation a mass the size of an orange was felt high up in the right broad ligament. Laparotomy was performed by Mr. Thornton, who removed from the right side a body "resembling a boiled suet dumpling," which was at first thought to be a pedunculated subperitoneal fibroid. On section this was found to be the enlarged ovary, the centre of which was occupied by a large cavity containing a hard blood-clot. It was evident that the original coagulum had contracted considerably, thus accounting for the diminution in the size of the tumor. There was no evidence of hæmatocele. This was an example of follicular hæmorrhage, such as has been described by Winckel and Olshausen, but the follicle had ruptured under pressure, leading to an effusion of blood into the stroma and involving imminent danger of rupture of the cortex of the ovary and fatal intra-peritoneal hæmorrhage.

BOLDT reported at the recent International Medical Congress a successful case of laparotomy for peritonitis, due to the rupture of a hæmatoma of the ovary. The patient stated that on the day preceding his first examination she had been seized with a sudden pain in the left ovarian region, and at once became unconscious. On admission to the hospital she had general pain in the abdomen and vomited frequently, her temperature ranging from 102.5° to 103.7°, and her pulse being 120 to 130. Vaginal examination was negative, but it was inferred that a pyosalpinx had ruptured. As she grew rapidly worse, the abdomen was opened two days later, and a quantity of bloody serum escaped. Nearly a quart of fluid and coagulated blood was removed from Douglas's pouch, and the left tube and ovary were removed, the right being normal. The cavity was irrigated, closed, and the patient made a rapid recovery. An examination of the specimen showed that it consisted of the nearly normal tube and a large ovary, on the posterior surface of which was a ruptured hæmatoma. Microscopically the growth appeared to be an endothelioma, which had become transformed into an angeioma, as described by Dr. Mary A. Dixon Jones.

---

### STRICTURE OF THE URETHRA IN WOMEN.

VAN DE WARKER (*New York Medical Record*, August 23, 1890) claims that non-traumatic stricture of the urethra in women is far more frequent than gynecologists admit, the failure to recognize its presence being due to improper methods of examination. Instead of using ordinary sounds to measure the calibre of the canal, he employs bulb-pointed bougies, which indicate minor degrees of contraction, such as are more common in women than are the tight strictures met with in the other sex. Contractions are usually found in the lower half of the canal, and are not infrequently arranged in groups, so that a No. 24 or 27 F. exploring bulb, when gently introduced slips along with a series of jerks with only a slight feeling of resistance. The resulting symptoms are due not so much to the existing contraction of the lumen as to the amount of local irritation. The patient gives a history of frequent and painful micturition, which may be relieved

for days or weeks at a time, or she may have no trouble until she has been on her feet for several hours; loss of control may be present. Mechanical obstruction is absent. The most common form of stricture is annular contraction of the meatus, ranging from 13 to 20 F. The treatment consists in gradual dilatation with steel sounds, incision being seldom required. Prolapse of the urethral mucous membrane is merely another form of stricture, as will be seen on introducing a bulb, and can be cured by dilatation, with or without excision of the redundant tissue. The operation should be repeated two or three times a week, and prolonged treatment is often necessary. The writer has had no experience with electrolysis as recommended by Fissiaux, but disapproves of it as a painful method presenting no advantages over dilatation.

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### Endoscopy of the Female Urethra in Gonorrhœa.

Janovsky (*Wiener med. Presse*, September 7, 1890) has practised endoscopy according to Grünfield's method in a large number of cases of gonorrhœa in the female, and has thus added considerably to our knowledge of the pathology of the disease. Examinations during the acute stage are difficult, it being necessary first to apply cocaine to the canal on account of its extreme sensitiveness. Acute gonorrhœa may be circumscribed or diffuse. The mucous membrane is much swollen, with collections of pus between the folds. The walls may be covered with small abscesses; Skene's lacunæ contain pus in which gonococci can always be found. Erosions and circumscribed hæmorrhages are frequent. A peculiar herpetic form of urethritis (non-specific?), often seen in prostitutes, presents appearances similar to those observed in the subacute stage of gonorrhœa. Two varieties of the chronic form are to be distinguished, one of which, corresponding to chronic urethritis in the male, is represented endoscopically either by separate nodules or by diffuse swelling of the mucosa, or the glands and lacunæ may be principally affected. The granular form originates in the lacunæ.

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### Injuries During Coitus.

This subject, which possesses considerable interest from a medico-legal standpoint, is well illustrated by the following cases:

Spaeth (*Zeitschrift für Geburtshülfe und Gynäkologie*, Band xix., Heft 2) calls attention to the danger of allowing coitus to take place too soon after a lacerated perineum has been repaired, and reports two unique cases. The patients were discharged from the hospital within a month after perineorrhaphy had been performed. In both instances intercourse occurred within two or three days after their return home, and transverse tears were caused in the posterior vaginal fornix, from which profuse hæmorrhage resulted which necessitated the application of sutures. It was remarkable that the injury occurred, not in the fresh cicatrix, but in the vaginal vault, which might be explained by the fact that the posterior wall of the vagina was shortened and thus put on the stretch in consequence of the operation.

Another woman, perfectly healthy, married at the age of thirty-one and from the first had pain during coitus. A few days after marriage she had violent pain during the act, which was followed by profuse hæmorrhage.

Four days later fecal matter escaped *per vaginam* while she was at stool. On examination the external genitalia were found to be normal. The columns of the posterior vaginal wall were torn away from their attachment, and there was a recto-vaginal fistula admitting the little finger.

HOFMOKL (*Internationale klinische Rundschau*, September 28, 1890) reports four cases that occurred in Vienna and Prague. In one case a powerful young man had intercourse with a widow, æt. fifty-eight, causing a tear in the vaginal fornix with profuse hæmorrhage.

In the second, violent coitus in a sitting posture produced a rupture of the posterior fornix involving the peritoneum; the patient lost much blood, but recovered.

The third case was that of a girl, æt. seventeen, whose lover had violent intercourse with her while she was in an exaggerated lithotomy position, causing a large tear in the right wall of the vagina.

The fourth case was that of a young girl who had an undeveloped vagina with absence of the uterus and adnexa. During a forcible and unsuccessful attempt at coitus she sustained a deep laceration of the left labium majus, which was torn away from the vaginal wall. The tear extended upward into the mons veneris and downward toward the rectum, while the finger could be introduced into the vaginal wound to the depth of two inches. Profuse parenchymatous bleeding was checked by pressure, and the patient was discharged at the end of four weeks cured, but still anæmic from the loss of blood.

In Spaeth's case of recto-vaginal fistula (the sixth on record), the injury did not occur during the first coitus, but after several successful attempts had been made; it appeared to be due not to any disproportion between the introitus and the male organ, but to an abnormal thinness of the recto-vaginal septum associated with a broad, resistant perineum. He classifies the different injuries as follows: Deep tears of the hymen, with profuse hæmorrhage, tears of the clitoris, of the urethra (in cases of atresia hymenis), vesico-vaginal fistula, laceration of the vaginal fornix (usually the posterior or lateral), and of the septum in a duplex vagina, to which should be added injuries of the vagina from premature coitus after perineorrhaphy.

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### GONORRHŒAL SALPINGITIS.

MERGE (*Med. Anzeiger zum Centralblatt für die Ges. Med.*, September 13, 1890), in his bacteriological examinations of the contents of the tubes from twenty-six cases of pyosalpinx, was able to demonstrate the presence of microörganisms in eight instances, Neisser's coccus being found in three specimens of pus. Bumm denied that contact of the gonococci with the peritoneum could produce a special variety of peritonitis, since only cylindrical epithelium was vulnerable as regards these microörganisms. Koch considers this question as still unsettled. The writer believes that if gonococci are found in pus within synovial cavities which are lined with a serous membrane, it is possible that the peritoneal cavity may contain similar pus. They may have existed and have been destroyed, so that we are not yet in a position to deny positively the possibility of a specific peritonitis due to the escape of gonorrhœal pus from the tubes.

### Kraurosis Vulvæ.

Orthmann (*Zeitschrift für Geburtshülfe und Gynäkologie*, Band xix., Heft 2) reports five cases of this peculiar form of atrophy of the pudenda, which was first described by Breisky, in a paper based upon an analysis of twelve cases. The latter describes the condition as an atrophy of the skin covering the external genitals, in consequence of which even the introduction of the finger into the vagina causes fissures in the soft parts. The introitus may become so narrowed as to interfere with coitus and parturition. Microscopical examination of sections of the affected skin show that there are retrograde changes in the upper layers of the corium, causing sclerosis of the papillæ, the rete being so thin in many places that the horny epidermis rests directly upon the papillæ. Sweat and sebaceous glands are absent.

Regarding the etiology of this peculiar affection, nothing is known. Treatment is useless. Fleischmann later reported eight cases, confirming Breisky's observations, and Janovsky six, the latter believing that long-standing blennorrhœa was a prominent etiological factor. Orthmann's careful studies led him to the same conclusion as Breisky, that the cause of this affection is unknown. In his cases there was excessive itching and burning, while in those of other observers this symptom was rarely present.

All the cases presented the characteristic appearances described by Breisky —smoothness, dryness and cicatrization of the skin, atrophy of the labia, and stenosis of the introitus. With regard to the treatment, after employing baths, lotions, and ointments in vain, Martin (who treated the patients in his private hospital) excised the diseased parts *in toto*, obtaining good union of the extensive wounds and complete relief of the distressing irritation, of which there had been no recurrence. Cases were reported by Schröder and Küstner, in which obstinate pruritus vulvæ was similarly treated with good results, but kraurosis has never before been treated surgically.

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## PÆDIATRICS.

UNDER THE CHARGE OF

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### Creolin for Certain Diseases of the Newborn and Nursing Infants.

In ten cases of purulent ophthalmia in the newborn, Schwing (*Arch. Ital. di Ped.*, 1890) used a one per cent. solution of creolin by irrigation. In two mild cases a cure resulted in six days. In the other eight it was used four or five weeks without satisfaction. A one or two per cent. solution of nitrate of silver was then used with better results.

In eleven cases of muguet and aphthæ, chlorate of potash, hypermanganate of potash, and boric acid were used for a long time without satisfaction. A one-per-cent. solution of creolin was then used five or seven days and produced complete cure. In omphalitis in the newborn, pure creolin, in the form of an unguent, was followed by disappearance of all inflammation in four days. Creolin rubbed upon erysipelatous patches gave gratifying results. The following formula gave good results in acute gastro-enteritis in three to six days: Creolin, 2 to 3 drops; canella water, two and a half ounces; syrup, five drachms. For young infants a teaspoonful was given every hour. For larger infants give creolin, fifteen grains, white sugar, seventy-five grains. Divide into five or ten powders, and give one or two daily.

In the surgical diseases of children asepsis of the surface and cavities of the body may be obtained with a one-half or one per cent. solution of creolin, and there need be no fear of toxic phenomena such as may follow the use of carbolic acid or sublimate.

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### Antiseptic Precautions in the Hygiene of Newborn Infants.

Epstein (*Jahrb. f. K.*, xxxi. 1, 2) considers that our knowledge and opinions in regard to infection and infectious disease have thus far taught us nothing in regard to the treatment of a disease which is already in progress. In other words, there are no specific antidotes. But in the way of prophylaxis much may be done, and notably so in diminishing the mortality from pyo-septicæmia in the newborn, a disease which is common both in public and private practice. Its diagnosis at this period of life is not easy, for fever and chill may be absent, nothing can be learned by interrogating the patient, and even post-mortem organic changes may not be demonstrable. A common accompaniment of the disease is intestinal catarrh, also a marked debility which may exist from birth. The disease is rarely acquired *in utero* or *inter partum*. Septic matter from without enters most frequently by the navel, but may enter through other avenues. The danger of navel infection is greatest during the first few days of life. Infection through the mouth may occur in diphtheria, septic croup, and aphthæ. Infection may be due to the aspiration of poisonous amniotic fluid, or to contact with the diseased genitals of the mother. Sepsis may develop insidiously, and suppurating processes not appear until months have elapsed. Prophylaxis should begin with most careful treatment of the umbilical cord, the object being to produce mummification as speedily as possible. Cleanliness on the part of the physician, nurse, and mother is indispensable. Créde's method of instilling one drop of a two per cent. solution of nitrate of silver into each eye at birth should always be practised as a preventive of blennorrhœa. If artificial feeding is a necessity, sterilized milk should invariably be used.

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### The Surgery of Herniæ of the Spinal Cord.

Boyer (*Jahrb. f. K.*, xxxi. 1, 2) has operated upon two cases for lesions of this character. The first was in an atrophic male infant ten days old with a meningo-myelocele as large as an apple in the lumbo-sacral region. The skin covering the tumor was red and inflamed, and already necrotic. There was

an opening of a finger's breadth in the region of the last two dorsal and first two lumbar vertebræ. The necrotic portions were disinfected and removed, and two lateral flaps made from the skin surface of the tumor; then the tumor was opened, the cauda equina separated from its inner wall and carefully laid in the spinal canal. The sac was removed and the wound carefully sutured. The sutures were removed on the fifth day. On the nineteenth day cerebro-spinal fluid trickled from a small fistula which remained after the rest of the wound had healed. This drainage continued six days, and then a silk suture was extruded through the fistula. The child did well for a time, but died at the end of two months. It was subsequently ascertained that the scar of the wound had ulcerated, and had been very imperfectly cared for. The cranium had become greatly enlarged, and there were extensive myosis and hemiplegia, with paralysis of the left facial and hypoglossus.

The second case was that of a well-nourished child ten months old with a meningocele upon the posterior half of the greater fontanelle, and a meningomyelocele, cystic in character, as large as a child's head, in the lumbo-sacral region. There was paresis of both lower extremities with incontinence of urine and fæces. After an unsuccessful but harmless puncture of the tumor, 880 cubic centimetres of cerebro-spinal fluid being withdrawn, the radical operation was performed. Two transverse skin flaps were made, the tumor was ligated and removed. In the posterior wall of the cyst and at its upper pole there was a portion of the spinal cord six centimetres in length, the cavity being bounded posteriorly by the spinal cord, but everywhere else by the arachnoid membrane. The cord running in the posterior cyst-wall contained a central cavity, which was lined with cylindrical epithelium. Within one month the child seemed to be entirely well.

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### The Irrigation of the Stomach in the Newborn.

As opposed to Ebstein's proposal to irrigate the stomach with the child in the dorsal position Faucher (*Jahrb. f. Kinderh.*, xxxi. 1, 2) proposes to hold the head of the child forward in order to prevent the contents of the stomach from slipping back into the pharynx. The arms of the child are to be secured behind with a napkin, then the gastric end of the stomach sound is placed in the child's mouth, which will cause sucking and swallowing movements. This will enable one to pass the sound into the pharynx. When the sound has been pushed well into place it may be held by the same one who holds the child. Then the irrigation with alkaline water may be accomplished in the same way as with an adult. A case is narrated of a strong male infant, nursed at the breast, who had vomited much of mucus and coagulated milk from the first few days of life. The mother had an abundance of milk, and had made the mistake of nursing the child too frequently. On the twenty-seventh day this child, which was strong at birth, was reduced to a skeleton, his skin was of a grayish color, his face shrivelled, his cry was feeble, there was obstinate constipation and almost constant vomiting. The indication for irrigation of the stomach seemed most urgent, and it was performed three times daily for two days, and then twice daily. The vomiting stopped, and only gas was passed. Then the food was kept down a longer

time, and began to be digested. The child began to sleep, its stools became normal, its skin natural. The washing was continued once a day by the mother until the end of the fourth month.

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### The Bearing of Inanition upon Infantile Mortality During the First Month of Life.

Nasi (*Arch. Ital. di Ped.*, May, 1890) gives the following:

1. The ultimate cause of the greater number of deaths during the first month of life is inanition.
2. It may exist in those who are apparently strong at birth as well as in those who are congenitally feeble.
3. Proper nutriment is a first consideration, and it must be given in a proper way.
4. Maternal nourishment is the best. It may be given direct from the breast, or by means of a nursing-bottle. For feeble children the bottle will be required.
5. A form of nursing-bottle is recommended which will answer all requirements.
6. If a wet-nurse is to be substituted for the mother, one must be obtained whose recent confinement will cause her to be a proper substitute.
7. If a wet-nurse is impossible, or if the milk of the wet-nurse contains colostrum corpuscles, a suitably-prepared milk should be given.
8. The vessel in which the milk is prepared should be aseptic.
9. Milk thus prepared may be the most satisfactory form of nourishment, especially for infants who are too feeble to suck.
10. In a few cases forced nourishment will be required, and by such means six months' infants may sometimes be reared.
11. Artificial nourishment, while not advisable in general, will yield better results according as the hygienic surroundings are favorable.
12. Mixed alimentation will sometimes give the best results, and by such means infants will frequently be saved who would otherwise die of inanition.

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Elegantly situated in the suburbs of the city, with every appointment and appliance for the treatment of this class of cases, including *Turkish, Russian, Roman, Saline* and *Medicated Baths*. Each case comes under the direct personal care of the physician. Experience shows that a large proportion of these cases are curable, and all are benefited from the application of exact hygienic and scientific measures. This institution is founded on the well-recognized fact that *Inebriety* is a *disease*, and *curable*, and all *these cases* require *rest, change of thought and living*, in the *best surroundings*, together with every means known to science and experience to bring about this result. Only a limited number of cases are received. Applications and all inquiries should be addressed,

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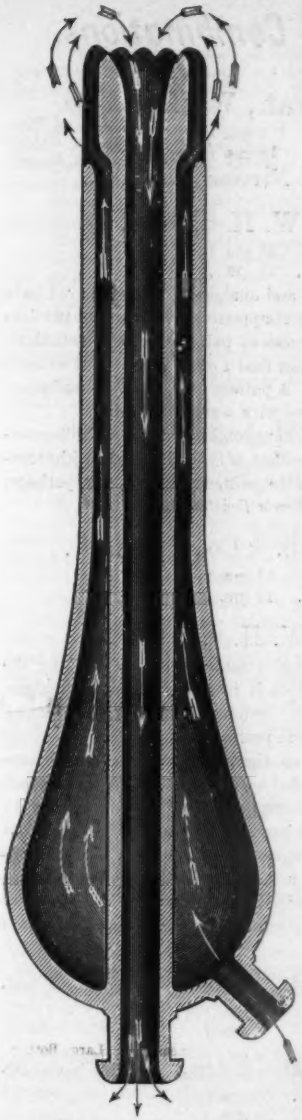

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1. This syringe acts upon the principle of a syphon.
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7. It does not soil the bedding or clothes.
8. It can be used in any position. Hence its value over all others for the intended purpose, especially for physicians and midwives.
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14. It can be adjusted to any position, always giving the same perfectly satisfactory results.
15. Made out of one solid piece, it can never get out of order.
16. It has no threads or joints for foul matter to gather.
17. It never gets dirty, because it feeds from clear water from one vessel and discharges the wash into another.
18. It is easily inserted.
19. It will last forever.

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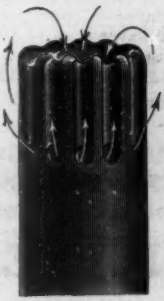

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# *New Remedies and New Combinations.*

**Pil. Phenacetine et Caffeiæ Citrat.,** W. H. S. & Co.

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|---|---|
| Phenacetine-Bayer | 3 grs. |
| Caffeiæ Citrat. | 1½ grs. |

Recommended in cases of Migraine and Nervous Headaches.

**Pil. Phenacetine et Salol,** 5 grs., W. H. S. & Co.

| | |
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| Phenacetine-Bayer | 2½ grs. |
| Salol | 2½ grs. |

Suggested by Dr. M. F. Price as an anti-rheumatic and analgesic. He says: "I have lately used Phenacetine largely, and have not been disappointed in its action, particularly as an analgesic. I have used it in nearly all cases of pains, especially neuralgic. I have learned to so thoroughly trust it to relieve pain that I often prescribe it without a searching inquiry into the character of the pain. A patient says, 'I have headache,' and I order Phenacetine with confidence, and always with a report of relief.

"It will be observed that in some of these cases I have combined Salol with Phenacetine. I did this on the principle of the well-known effect of Salicylic Acid in Rheumatism, but I rely on the Phenacetine for the relief of the pain, and in this way, perhaps, the cure of the disease causing it."—*Southern California Practitioner.*

**Pil. Phenacetine et Salol,** W. H. S. & Co., ½ strength.

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| Phenacetine-Bayer | 1¼ grs. |
| Salol | 1¼ grs. |

**Pil. Arsenici Sulphidi,** 1-100 gr., W. H. S. & Co.

Dr. McLaughlin (Am. Med. Ass'n) finds Sulphide of Arsenic to be tolerated by the stomach better than arsenic in other forms. He gives it in the crude form (Realgar, $As_2S_2$) in granules of 1-100 grain (0.0006 gramme) "ordered from Schieffelin & Co., of New York" In one patient who had suffered from psoriasis more or less for twenty years it was of great service. The eruption was on the arms, back, head and forehead; his hands were covered with fissures, which bled when the fingers were extended; the nails were black and roughened. One granule increased to eight granules, t. i. d., in mouth caused the fissures to heal. The face and hands were practically well. The drug was stopped for one week, when the eruption spread very rapidly. The granules were again given and improvement followed in a few days. The general health improved rapidly. In acne and eczema he has obtained satisfactory results. In every case the patient was unaware that arsenic was being administered.—*Journal American Medical Association.*

**Tablets Sulfonal et Phenacetine,** 15 grs., W. H. S. & Co.

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| Sulphonal-Bayer | 10 grs. |
| Phenacetine-Bayer | 5 grs. |

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| Sulphonal-Bayer | 5 grs. |
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☞**For full information regarding our Soluble Pills we refer to our formula books and price lists, which we shall be happy to furnish upon application.**


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# ARISTOL.

ARISTOL, a combination of iodine and thymol, manufactured by the Farbenfabriken, formerly Friedr. Bayer & Co., Elberfeld, Germany, is a valuable, inodorous and non-toxic antiseptic remedy said to be superior to Iodoform, Iodole and Sozo-Iodole.

ARISTOL is insoluble in water and glycerine, and very sparingly in alcohol, but is very easily soluble in ether and chloroform. The ether solution is precipitated by the addition of alcohol. ARISTOL is very freely soluble in fatty oils. The solution must be made in the cold, by stirring, as the use of heat causes a decomposition. For the same reason it is necessary to protect the body from light and keep it in opaque bottles. It very readily adheres to the skin, and can thus be used as a powder strewn over wounds and burns.

In cases of mycosis it also acts well, and more quickly than any other known remedy, and does not cause irritation, like so many drugs.

The effective use of ARISTOL in psoriasis is of great interest, as our Materia Medica has hitherto supplied us with no non-poisonous drug, save only chrysarobin, the use of which is associated with a deep skin coloration and conjunctivitis—drawbacks from which ARISTOL is absolutely free.

In cases of lupus it is said to surpass even the best known remedies.

The value of ARISTOL can scarcely be over-estimated, as we have in it a drug possessing the good properties of Iodoform, but free from its toxic qualities. Its freedom, too, from any suspicious odor will be at once appreciated, both by the physician and his patient.

*ARISTOL, prepared by the Farbenfabriken, formerly Friedr. Bayer & Co., Elberfeld, is supplied by us in ounces.*

# SULFONAL-BAYER.

***The value of Sulfonal in children's diseases.***—DR. WILLIAM C. WILE sent a paper with this title to the American Medical Association, in which he stated that Sulfonal was the ideal hypnotic. It was without the bad effects of opium and the uncertainty of the bromides. It could be given in ten-grain doses. It quieted reflex irritability. It did not constipate nor disturb the stomach. In one case in which a drachm was taken accidentally in ten-grain doses, there was a deep slumber lasting twenty-four hours, slight fever, but a normal pulse and respiration.—*Medical Record*, New York.

DR. HENRY M. FIELD, in a paper presented to the American Medical Association, says: "Clinically observed, we recognize in Sulfonal a mild calmative, *a slowly, but progressively acting hypnotic;* it has no other action, and its operation is attended by no complications, near or remote. It is therefore a pure hypnotic, and, we submit, it is the only pure hypnotic we possess, up to date."—*New England Medical Monthly.*

*Sulfonal-Bayer, prepared by the Farbenfabriken, formerly Friedr. Bayer & Co., Elberfeld, is supplied by us in ounces and in the form of Tablets of* 5, 10 *and* 15 *grains, put up in bottles of* 10 *and* 100 *tablets each.*

*We also offer Sulfonal-Bayer in the form of our soluble pills containing* 5 *grains each.*

# PHENACETINE-BAYER.

***Phenacetine in Insomnia.***—DR. F. PEYRE PORCHER, of Charleston, S. C., writes: "I desire to call special attention to the extreme value of Phenacetine as a remedy for insomnia. Given at night in a little water it is tasteless, innocuous, and induces sleep. I am confident, also, after repeated trials, that it is the best and most unobjectionable substitute for morphia. It causes sleep when, of course, pain is in abeyance, unless the pain be more than ordinary, and morphia hypodermically may then be required. The remedy may be repeated and the dose increased to seven or ten grains.

"Suffering from chronic rheumatism of the forearm, I have tested it repeatedly in my own person, and have given it to many who have suffered from insomnia, or inability to sleep from any transient cause, fatigue, nervousness, excitement, etc., in either sex." * * * * *—*Medical Record*, New York.

*Phenacetine-Bayer, prepared by the Farbenfabriken, formerly Friedr. Bayer & Co., Elberfeld, is supplied by us in ounces and also in the form of our soluble pills and compressed tablets, containing two, four and five grains each. Either form may be obtained of any reputable apothecary.*

It gratifies us to be able to announce that PHENACETINE, SULFONAL and SALOL have been incorporated into the new German Pharmacopœia just issued, and have been proposed by the General Medical Council of Great Britain for introduction into the forthcoming Addendum to the British Pharmacopœia. This action confirms and endorses our judgment in introducing these valuable remedies to the medical profession of the United States, and is a natural sequence of the favorable results experienced in their employment, and of the brilliant and conclusive testimony thereof, which had been so freely furnished by the most talented of the profession both in Europe and in the United States.


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## UTERINE TONIC, ANTISPASMODIC AND ANODYNE.

A reliable and trustworthy remedy for the relief of Dysmenorrhœa, Amenorrhœa, Menorrhagia, Leucorrhœa, Subinvolution, THREATENED ABORTION, Vomiting in Pregnancy and Chlorosis; directing its action to the entire uterine system as a general tonic and antispasmodic.

**DIOVIBURNIA** is prepared for prescribing exclusively, and the formula as given will commend itself to every intelligent physician.

FORMULA.

Every ounce contains ½ dram each of the fluid extracts: Viburnum, Prunifolium, Viburnum Opulus, Dioscorea Villosa, Aletris Farinosa, Helonias Diocia, Mitchella Repens, Caulophyllum Thalistroids, Scutellaria, Dateriflora.

DOSE.—For adults a dessertspoonful to a tablespoonful three times a day, after meals. Where there is much pain, doses may be given every hour or two, ALWAYS IN HOT WATER.

Jno. B. Johnson, M. D., Professor of the Principles and Practice of Medicine, St. Louis Medical College.

ST. LOUIS, June 20, 1888.

I very cheerfully give my testimony to the virtues of a combination of vegetable remedies prepared by a well-known and able pharmacist of this city, and known as DIOVIBURNIA, the component parts of which are well known to any and all physicians and have no relation to proprietary or quack remedies. I have employed this medicine in cases of dysmenorrhœa, suppression of the catamenia, and in excessive leucorrhœa, and have been much pleased with its use. I do not think its claims (as set forth in the circular accompanying it) to be at all excessive. I recommend its trial, believing it will give satisfaction.

Respectfully,

Jno. B. Johnson

L. Ch. Boisliniere, M. D., Professor of Obstetrics, St. Louis Medical College.

ST. LOUIS, June 18, 1888.

I have given DIOVIBURNIA a fair trial and found it useful as an uterine tonic and antispasmodic, relieving the pains of dysmenorrhœa, and regulator of the uterine functions. I feel authorized to give this recommendation of DIOVIBURNIA, as it is neither a patented nor a secret medicine.

L. Ch. Boisliniere M.D.

H. Tuholski, M. D., Professor Clinical Surgery and Surgical Pathology, Missouri Medical College; also Post-Graduate School of St. Louis.

ST. LOUIS, June 23, 1888.

I have used DIOVIBURNIA quite a number of times—sufficiently frequently to satisfy myself of its merits. It is of unquestionable benefit in painful dysmenorrhœa; it possesses antispasmodic properties which seem especially to be exerted on the uterus.

Dr. H. Tuholske

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### *A TRUSTWORTHY REMEDY IN EXTERNAL EYE DISEASES.*

THE forms of disease for which this compound is highly recommended are the following: Simple Conjunctivitis, Acute and Chronic Catarrhal Conjunctivitis, Venereal Conjunctivitis, Acute and Chronic Blenorrhœal Conjunctivitis, Strumous or Scrofulous Conjunctivitis, Marginal Blepharitis and Inflammation of the Lachrymal Sac.

**PALPEBRINE** is not a SECRET remedy, we give the formula in full. It contains no unknown and untried agents, but is composed of the following well-known drugs which will commend it to the profession at once.

FORMULA.

Acidum Boracicum, one per cent.; Hydrargyrum Bichloridum, one part in 5000; Tincture of Opium, a trace; Zincum Sulphuricum, one part in 1000; Glycerinum Purum, one part in 10.

IN OFFERING PALPEBRINE to the profession we wish to give to the busy practitioner a reliable and safe remedy, easily prescribed, of known qualities and quantities. We are certain after a trial our efforts will be appreciated.

TO ANY physician, unacquainted with the medicinal effects of DIOVIBURNIA and PALPEBRINE, we will mail pamphlet containing full information, suggestions, commendations of some of the most prominent practitioners in the profession, and various methods of treatment; also a variety of valuable prescriptions that have been thoroughly tested in an active practice, or to physicians desiring to try our preparations, and who will pay express charges, we will send on application a sample bottle of each free.

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**(JANUARY 1st, 1890)**

**TOTAL INCOME, over Twenty-nine Million Dollars.**
**BENEFITS TO POLICY HOLDERS, over Twelve Million Dollars.**
**INTEREST INCOME, nearly Five Per Cent. on Average Net Assets.**
**NEW INSURANCE WRITTEN, over One Hundred and Fifty-one Million Dollars.**
**ASSETS, over One Hundred and Five Million Dollars.**
**SURPLUS, by the N. Y. State Standard, over Fifteen and a Half Million Dollars.**
**INSURANCE IN FORCE, over Four Hundred and Ninety-five Million Dollars.**

## PROGRESS IN 1889.

| | |
|---|---|
| INCREASE IN INTEREST | $ 303,653 06 |
| INCREASE IN BENEFITS TO POLICY HOLDERS | 1,148,051 61 |
| INCREASE IN SURPLUS FOR DIVIDENDS | 1,716,849 01 |
| INCREASE IN PREMIUMS | 3,458,330 35 |
| INCREASE IN TOTAL INCOME | 3,761,983 41 |
| INCREASE IN ASSETS | 11,573,414 41 |
| INCREASE IN INSURANCE WRITTEN | 26,099,357 00 |
| INCREASE IN INSURANCE IN FORCE | 75,715,465 00 |

## GROWTH OF BUSINESS IN PENNSYLVANIA.

PREMIUMS COLLECTED.

| | |
|---|---|
| 1880 | $ 198,000 |
| 1881 | 242,500 |
| 1882 | 316,800 |
| 1883 | 401,500 |
| 1884 | 470,200 |
| 1885 | 596,900 |
| 1886 | 835,100 |
| 1887 | 1,047,500 |
| 1888 | 1,058,000 |
| 1889* | 1,235,100 |
| | $6,401,600 |

*Including Pa. Premiums paid in New York.

**The total Premiums Collected in entire agency in 1889 was over $2,600,000**

We offer two forms of policies combining the Non-forfeiting features originated by the New York Life Ins. Co. in 1860: One for protection only—where a low rate of premium is charged, the protection large and the returns showing a modest profit in cash. The other form—where the premium is large—will show an investment equal to the face of the policy and fifty per cent. of all premiums paid thereon.

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## THE HYPNOTIC.

**FORMULA.—**

Every fluid drachm contains 15 grains EACH of Pure Chloral Hydrat. and purified Brom. Pot., and one-eighth grain EACH of gen. Imp. ext. Cannabis Ind. and Hyoscyam.

**DOSE.—**

One-half to one fluid drachm in WATER or SYRUP every hour, until sleep is produced.

**INDICATIONS.—**

Sleeplessness, Nervousness, Neuralgia, Headache, Convulsions, Colic, Mania, Epilepsy, Irritability, etc. In the restlessness and delirium of fevers it is absolutely invaluable.

**IT DOES NOT LOCK UP THE SECRETIONS.**

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## THE ANODYNE.

Papine is the Anodyne or pain-relieving principle of Opium, the Narcotic and Convulsive Elements being eliminated. It has less tendency to cause Nausea, Vomiting, Constipation, Etc.

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Same as Opium or Morphia.

**DOSE.—**

(ONE FLUID DRACHM)—represents the Anodyne principle of one-eighth grain of Morphia.

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## The Alterative and Uterine Tonic.

**FORMULA.—**

Iodia is a combination of active principles obtained from the Green Roots of Stillingia, Helonias, Saxifraga, Menispermum, and Aromatics. Each fluid drachm also contains five grains Iod. Potas., and three grains Phos. Iron.

**DOSE.—**

One or two fluid drachms (more or less as indicated) three times a day, before meals.

**INDICATIONS.—**

Syphilitic, Scrofulous and Cutaneous Diseases, Dysmenorrhea, Menorrhagia, Leucorrhea, Amenorrhea, Impaired Vitality, Habitual Abortions, and General Uterine Debility.

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# BELLEVUE HOSPITAL MEDICAL COLLEGE

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## SESSIONS OF 1890-91.

The REGULAR SESSION begins on Wednesday, September 24, 1890, and ends about the middle of March, 1891. During this session, in addition to the regular didactic lectures, two or three hours are daily allotted to clinical instruction. Attendance upon at least two regular courses of lectures is required for graduation.

The SPRING SESSION consists of recitations, clinical lectures and exercises, and didactic lectures on special subjects. This session begins about the middle of March and continues until the middle of June. During this Session, daily recitations in all the departments are held by a corps of Examiners appointed by the Faculty.

The CARNEGIE LABORATORY is open during the collegiate year, for instruction in microscopical examinations of urine, practical demonstrations in medical and surgical pathology, and lessons in normal histology and in pathology, including bacteriology.

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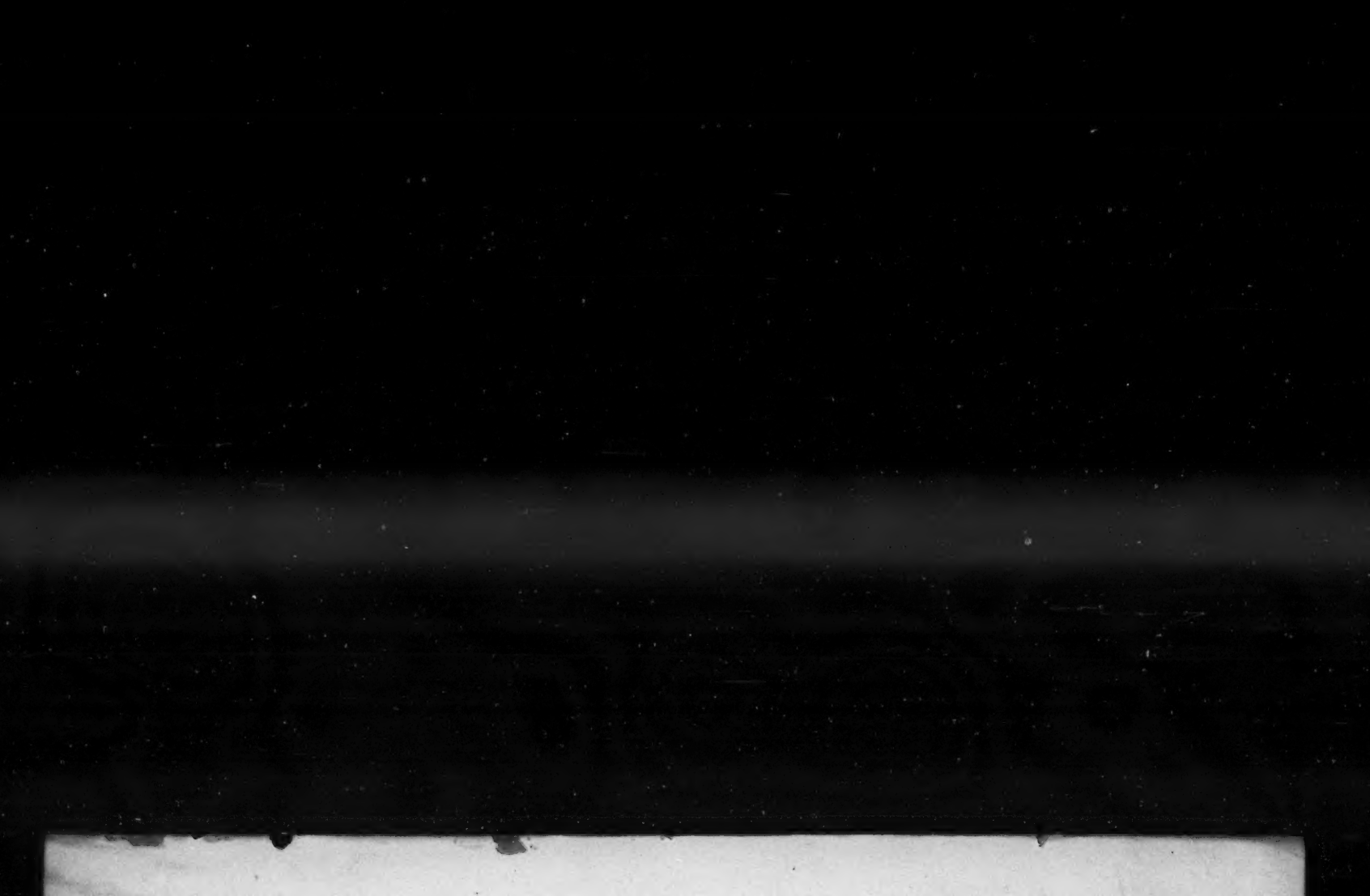

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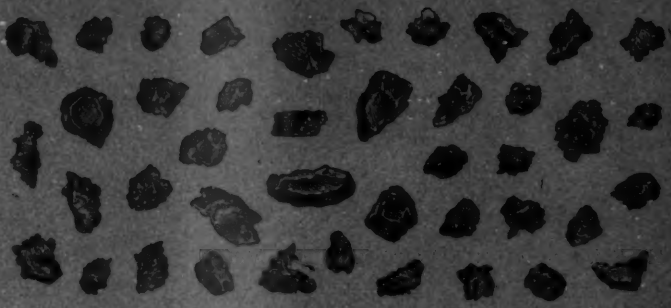

## Its Uses after Surgical Operations, etc.

[Reprint from Editorial in April number, 1890, of the Virginia Medical Monthly.]

Hunter McGuire, M.D., LL.D., etc., formerly Professor of Surgery in the Medical College of Virginia, Ex-President of the Southern Surgical and Gynæcological Association, etc., in a recent conversation with us on the subject of Mineral Springs Waters, made special mention of the use of Buffalo Lithia Water after cases of laparotomy and other surgical operations. Feeling assured that his views on this subject would be of interest to the Profession generally, we requested a statement of his opinion, and obtained his permission to quote him as follows:

"RICHMOND, VA., March 24th, 1890.

"*Dear Mr. Edwards*—I have just received your letter of this date. I use Buffalo Lithia Water very freely in my hospital. After every case of laparotomy, I give this water for its diuretic properties, and because the stomach bears it so well—often retaining it when everything is rejected. Indeed, I use it freely after nearly all my surgical operations. It is especially valuable in supra-pubic cystotomy. Many years' experience in its use only confirms the good opinion I have so often expressed in regard to it.

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